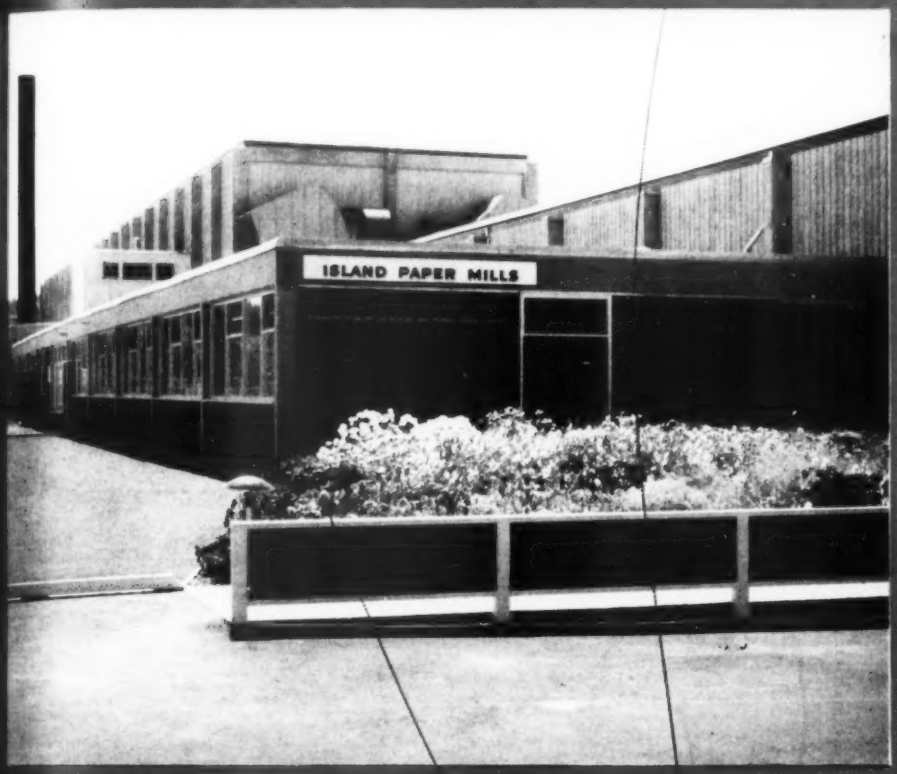
JANUARY 1961

The Paper Industry



View of Island Paper Mills — Western Canada's first fine paper mill.

Western Canada's first fine paper mill

Rheology of paper coating

The ABC's of felt conditioning

New development in synthetic fiber paper

Publishers of PAPER AND PULP MILL CATALOGUE

"Privileges of the Free Enterprise System"

What a subject! I've got lots of things to say on this one.

What does the free enterprise system mean to you in terms of your home and family, your job, your community? What are the benefits and advantages of your way of life compared to what you might expect if you lived in a communistic country or under a dictator?

REMEMBER, ideas are what count . . . . not writing skills . . . . Send your ideas along and be eligible to win one of . . . .

10 GRAND PRIZES

FIRST PRIZE	**$1000**
SECOND PRIZE	**$ 750**
THIRD PRIZE	**$ 500**

and seven prizes of $200 each

CONTEST RULES

1. The Bolton Award is open to all persons engaged in the pulp, paper or paper converting industry in the United States and Canada.
2. Confine your paper to 1500 words, type with double spacing on one side only of size 8½" x 11" sheets.
3. On the cover sheet only, include your name, the name and address of your mill, your job or title and home address.
4. Mail your entry postmarked before midnight **March 31, 1961**

to

The Secretary and Treasurer
Paper Industry Management Association
10 North Clark Street
Chicago 2, Illinois

THE 14TH ANNUAL BOLTON AWARD ESSAY CONTEST

Sponsored by:
The Paper Industry Management Association
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and John W. Bolton & Sons, Inc.
Lawrence, Massachusetts

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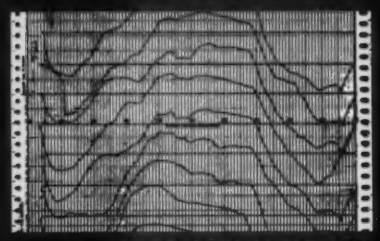
Consolidated Water Power & Paper Company,
the world's largest specialist in enamel printing papers, ***reports:***

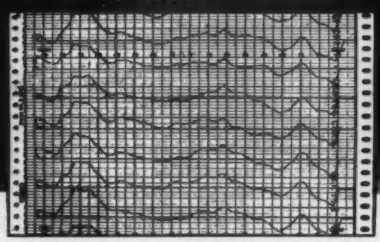
CURTISS WRIGHT
AQUATEL®

"Indispensable"

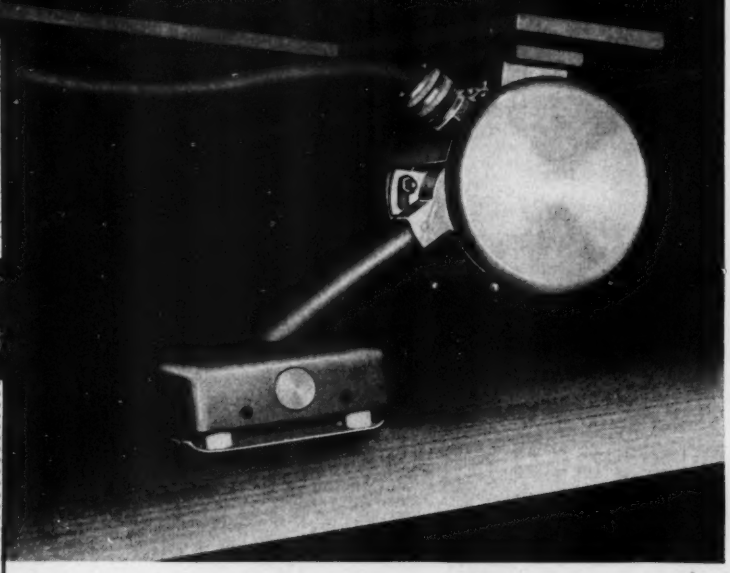
to Cross-Machine Moisture Profile Control



Moisture variation of 4% shown at start before corrective adjustments were made.



Corrective action with AQUATEL eliminates "wet center — dry edge" condition . . . total variation drops to 0.6%.



There are many reasons for this enthusiastic acceptance of Curtiss-Wright AQUATEL at Consolidated. Foremost is the phenomenal speed in reading moisture content and the quick recorder indication of moisture change while scanning the entire web width — an exclusive feature of AQUATEL. High accuracy detects and shows moisture change as low as 0.2%. A continuous graphic analysis provides an unmistakable guide for corrective action.

In conjunction with Beloit Iron Works' new "Air Cap" air hood moisture profile corrector, AQUATEL reduces edge to center moisture variation from 4% or more to ¾% or less — a substantial 82% reduction.

Elimination of "wet streaks" not only improves gloss uniformity and reduces blackening on super calender but also yields a stronger sheet — greatly reducing costly breaks. These are imperative qualities in the paper used on high speed presses of leading national magazines.

Bulletins and services of our field engineers are available to show how Curtiss-Wright AQUATEL can benefit your profit picture. Phone SWinburne 9-0500 or write.

Princeton Division **CURTISS WRIGHT** Princeton, New Jersey
CORPORATION

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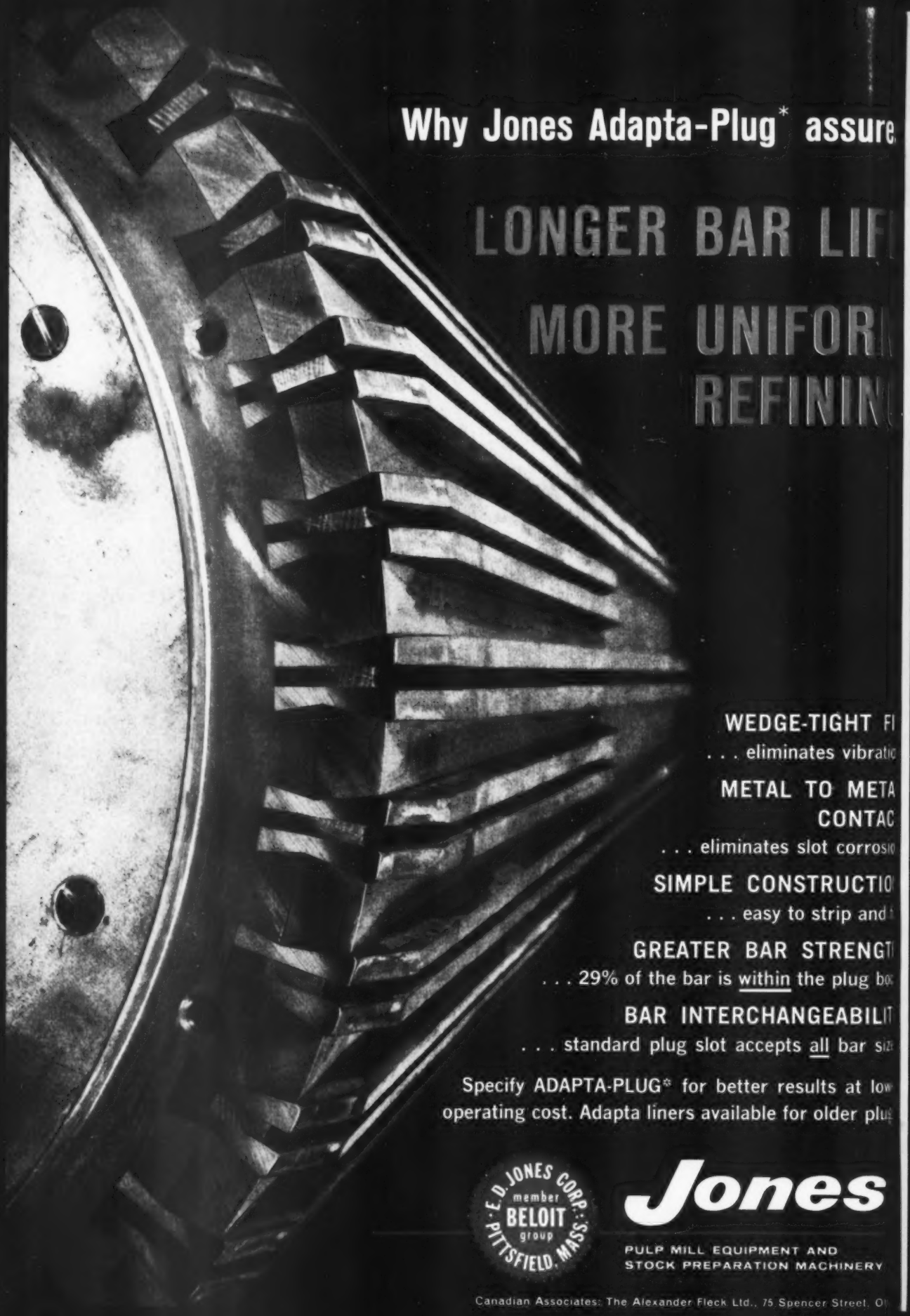
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MORE UNIFORM
REFININ
WEDGE-TIGHT FI
. . . eliminates vibratio
METAL TO META
CONTAC
. . . eliminates slot corrosio
SIMPLE CONSTRUCTIO
. . . easy to strip and
GREATER BAR STRENGT
. . . 29% of the bar is within the plug bo
BAR INTERCHANGEABILIT
. . . standard plug slot accepts all bar siz
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The Paper Industry

Technology • Engineering • Management • Production

VOLUME 42 **NUMBER 10** **JANUARY 1961**

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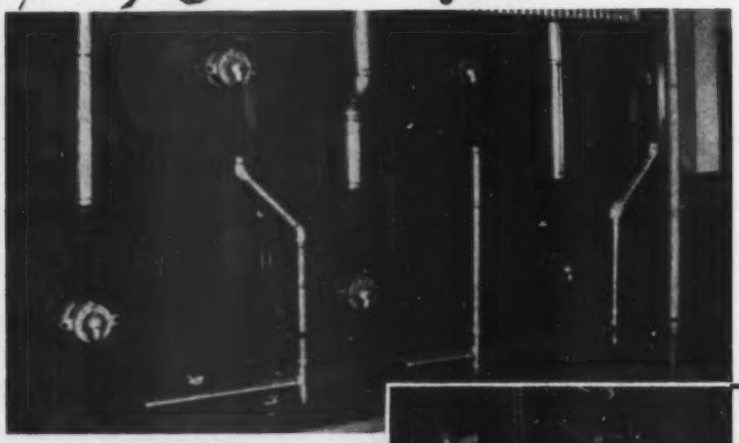
For New Paper Machines... or making old ones like new!

Be sure to specify Johnson Rotary Pressure Joints

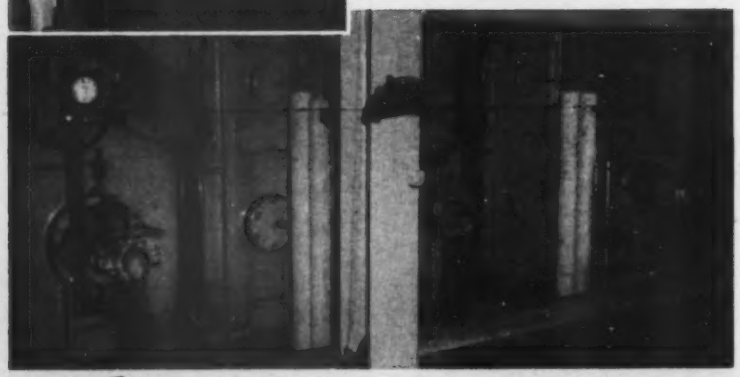


First of all, with Johnson Joints you can expect trouble-free service and long operating life unmatched by any other method of getting steam into dryer rolls.

More importantly, Johnson Joints often hold the key to higher operating speeds and pressures, and to improved methods of roll drainage. They make possible a higher level of over-all performance and efficiency.

All machinery manufacturers can furnish Johnson Joints. There are sizes, types, mountings for all paper machines—either stationary or rotating syphon pipes—and for calenders and corrugators, too.

Try a pair 90 days in your mill; no obligation. Write for information.



Two more with JOHNSON JOINTS *-one new, one rebuilt*

Here's a brand new paper machine (top) built by Beloit Iron Works, and one that's been rebuilt by Beloit. The new machine is in a midwest mill, has 61 Johnson Joints. The rebuilt is in a Pacific northwest mill, has 54 Johnson Joints. These are Type L-N Joints, for high speed machines with rotating syphon pipes; all internal parts, including syphon pipe, rotate as a unit. Other features:

SUPER CONSTRUCTION —
Rock-hard "Green Streak" seal rings, plus special process Ni-Chrome plating, slash friction and wear.

"QUICK RELEASE" NIPPLE —
Easy on, easy off.

ROD SUPPORTED —
Weight of housing, piping carried by support rods. Rotating assembly literally "floats" inside.

JC

845 WOOD STREET • THREE RIVERS, MICHIGAN

Rotary Pressure Joints • Direct Operated Solenoid Valves

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From our point of view..

Modernization of production facilities a major program for 1961

As envisaged by the Department of Commerce, production of the U.S. pulp and paper industry in 1961 will increase by 1.5 per cent over that of 1960. This means a considerably decreased rate of production-increase, when compared with the average annual rate of increase of 3.8 per cent.

When production is down, the plans of the industry automatically shift from the installation of new manufacturing facilities to modernization of operating processes and replacement of near-obsolete equipment.

The increasingly competitive nature of the global market for products of the pulp and paper industry — which will undoubtedly become even more of a problem with the entry into this picture of a sizeable and modernly equipped segment of the U. S. S. R. pulp and paper industry in the middle sixties — makes it imperative that the U. S. A. modernize its mills to a point of maximum productivity. There is no reason why this country, with its engineering ingenuity and mass-production techniques, should not be able to achieve a level of productivity which would permit it to compete favorably on the world market, even should the Soviet Union for political reasons persist in periodically dumping its products on the market at below-production costs.

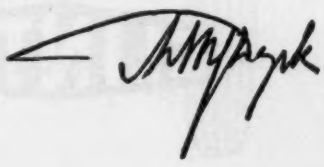
It is hoped that the New-Frontiers concept of the new administration has room for the inclusion of provisions favorable to the creation of an economic climate needed for the implementation of a vast modernization program of the American industry as a whole.

What can the government do to create the favorable climate needed to substantially increase the industry's productivity? One obvious solution to this problem is a liberalization of tax depreciation laws, so that the industry can write-off the cost of new equipment as quickly as possible.

An example of how beneficial a liberalization of tax depreciation laws can be, is provided by what is commonly known as the "miracle of West German economic recovery". The 50 per cent write-off of the cost of new equipment in devastated Germany resulted in such rapid industrial expansion that the depreciation write-off had to be reduced to 20 per cent in 1955, which is still more than twice that permitted in the U. S. A.

France, under DeGaulle's administration, followed the German example and permitted a write-off of 50 per cent on equipment which has a depreciation life of three years and a 25 per cent write-off on equipment depreciating in 10 or more years. The effect of such liberalization of tax depreciation laws, as stated with characteristic simplicity and logic by French economists, "practically compells industry to re-equip and modernize itself".

It does not take much foresight to conclude that a revitalized industry that can effectively compete on world markets is of infinitely more value to the nation, and also to the Treasury, than the corporate tax revenue that would be lost to the Treasury under a liberalization of tax depreciation laws.



No coating is any more durable than the adhesive that holds it together and binds it to the paper. CLINTON starches and dextrins make sure that your coated stock has a uniform finish free from "skips." Used as a clay coating or as a size, CLINEO starches add a high degree of strength and gloss printing quality to gloss surfaces. CLINCAL starches — containing their own lubricants — improve printability and control curl. Both starches are available in many varieties. For quality that makes a lasting impression on customers and prospects, use CLINTON coating starches.

Watch Clinton for new product developments

CLINTON CORN PROCESSING COMPANY

CLINTON

CLINTON, IOWA

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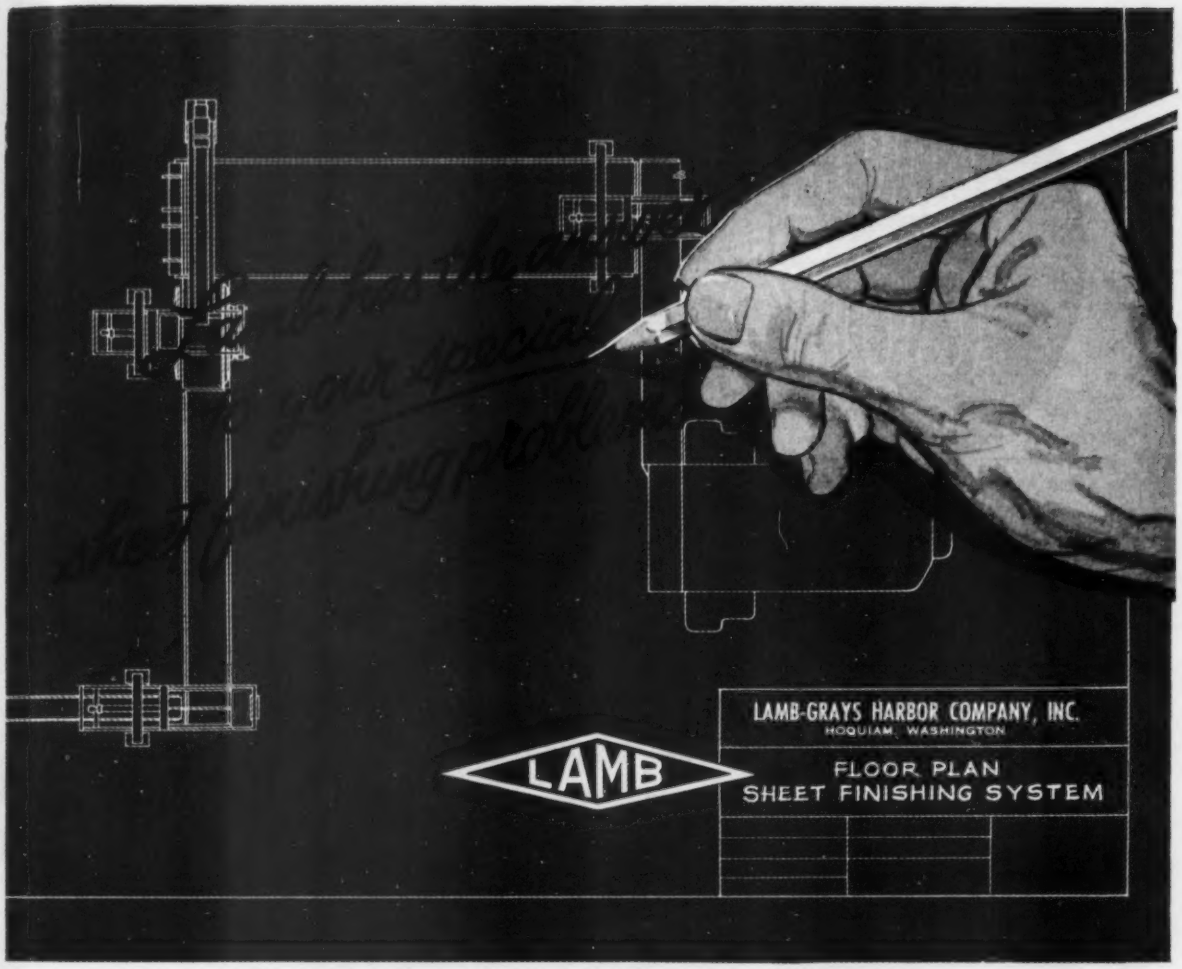

A Blueprint for Better Sheet Finishing Systems

YESTERDAY'S sheet finishing plant does not have to be rebuilt from the ground up to meet present day efficiency standards. Modern LAMB Sheet Finishing Systems and Equipment are designed to fit existing space, conditions, and equipment with a minimum of dislocation.

TODAY'S sheet finishing problems can be solved quickly with application of LAMB "know how" and equipment. Where there are *special* problems, LAMB provides *special* answers. And LAMB is geared for expeditious design, fabrication, and installation.

TOMORROW'S paper finishing developments have been considered in the development of present equipment and systems. LAMB finishing room specialists will have a practical and economic solution for your future needs.

TO LEARN MORE ABOUT LAMB SHEET FINISHING SYSTEMS

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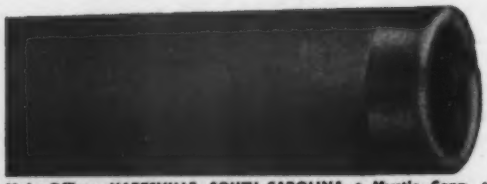
GET more FOR YOUR core DOLLAR....

Sonoco's coast to coast plant locations assure dependable supply and uniform quality!

No matter where you are located, one of SONOCO's plants is nearby offering a dependable supply of economical, uniform quality cores. SONOCO's 60 years' experience, a completely integrated manufacturing operation and continuous research make these advantages possible.

SONOCO cores are made to exacting torque and crush strength specifications. Production is under rigid control from raw material to the finished core. Non-returnable cores are available in all sizes. Returnable cores, with or without famous SONOCO metal ends, are made in all standard sizes. SONOCO can also supply a complete line of metal end core machinery and core cutters.

Regardless of your core needs, you'll get more for your core dollar from SONOCO in service, quality and economy. Call or write today!



SONOCO
Paper Mill Cores

SONOCO PRODUCTS COMPANY 1104

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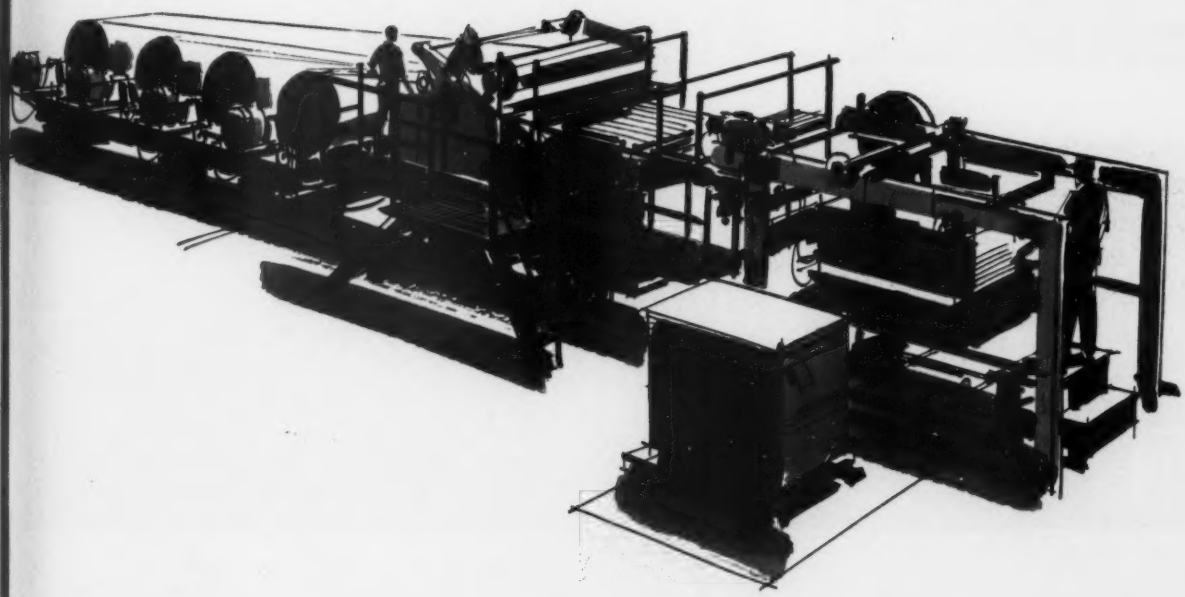
THE MOORE AND WHITE R-100 CUTTER-LAYBOY UNIT



Moore and White's new R-100 Cutter-Layboy Unit is the result of a highly progressive research program and over 75 years' experience of building custom machines for the paper industry. Ruggedly designed to keep maintenance at a minimum and speed at a maximum, while maintaining desired sheet length accuracy. The R-100 appeals not only to machine owners because of its sensible pricing structure but also to operators because of the many new time saving innovations — strategically located auxiliary controls—shuttle type backstands and automatic side delivery of skids.

THE MOORE AND WHITE R-100 CUTTER-LAYBOY UNIT

SHUTTLE BACKSTAND ELIMINATES DOWNTIME

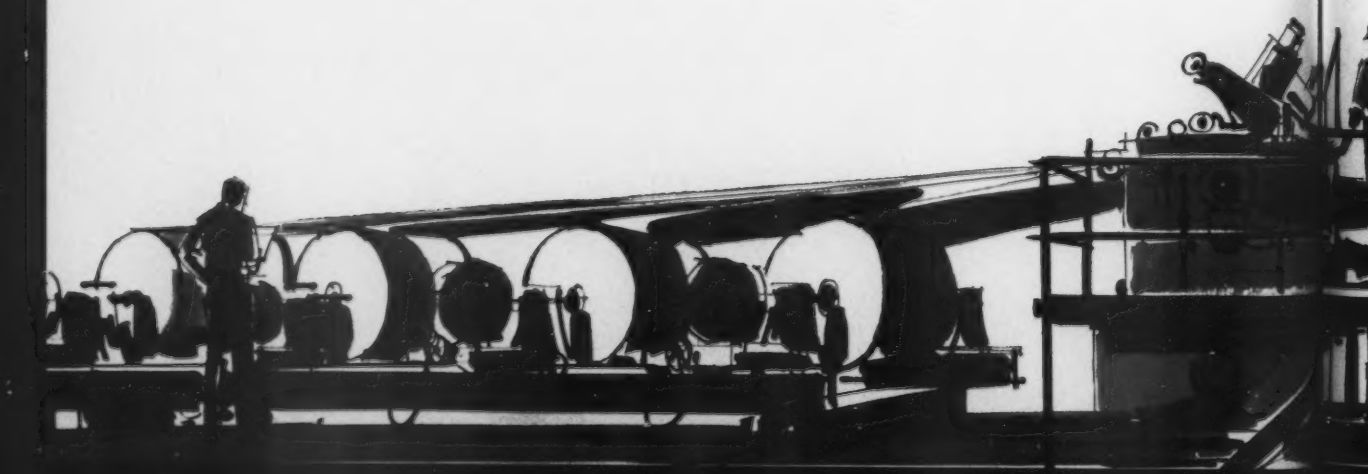
The Moore and White Shuttle type Backstand eliminates ti
normally spent for roll loading, therefore minimizing downti
Twin backstands are mounted on a motor operated carriage p
mitting one backstand to feed the cutter while the other backsta
is being loaded with the next set of rolls. Backstand bearings a
designed for both crosswise and endwise adjustment for accura
aligning of rolls. Air regulated brakes give the operator individ
control of sheet tensions.

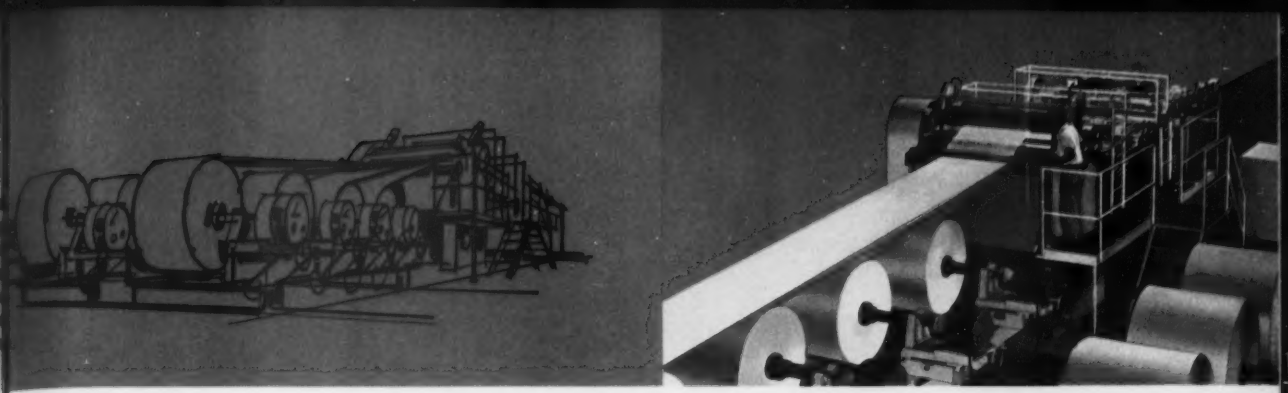
ACCURATE CUTTING PERMITS DIRECT SHIPMENTS FROM LAYBOY

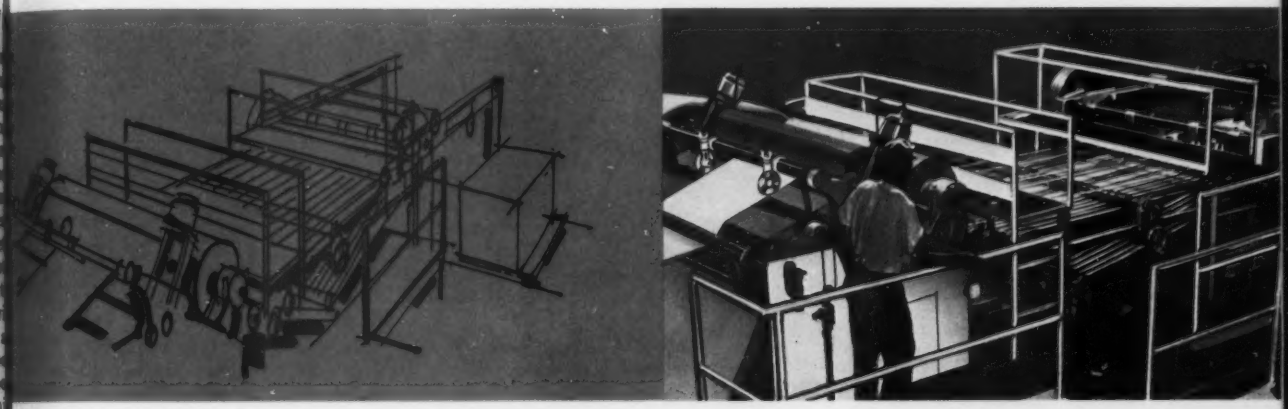
The cutter frames are of heavy duty construction for vibrationl
performance. Sheet length range is controlled through P.I.V. un
Changes within range are obtained quickly and positively by mea
of a handwheel with a dial indicator. Accuracy can be maintain
within 1/64" tolerance. The revolving knife and bed knife a
mounted as a unit in a slope rather than the conventional ho
zontal mounting to allow the sheeted paper to be transferred in
the conveying tapes with a minimum drop from the point of she
A finger roll is furnished at nip of draw roll for operator's safe
Special doctor guide boards are telescopic, one section held s
tionary and the other moving when the knife assembly is adjus
for sheet squareness, thus keeping the board in alignment wi
bed knife blade at all times. All rolls and vital moving parts a
balanced and mounted in anti-friction bearings to insure smo
and efficient operation. The cutter is driven by a variable sp
drive operating on either AC or DC, located within the machi
frames.

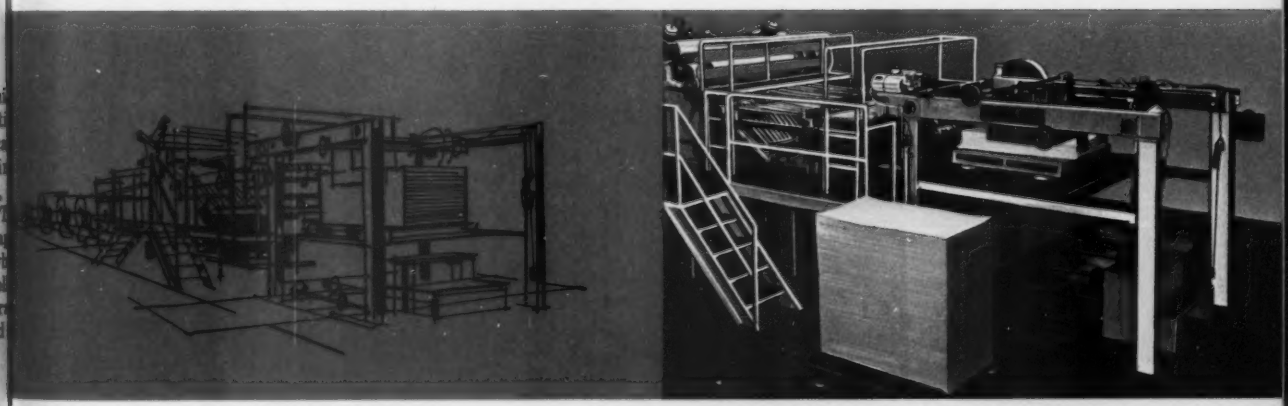
AUTOMATIC SIDE REMOVAL INCREASES PRODUCTION

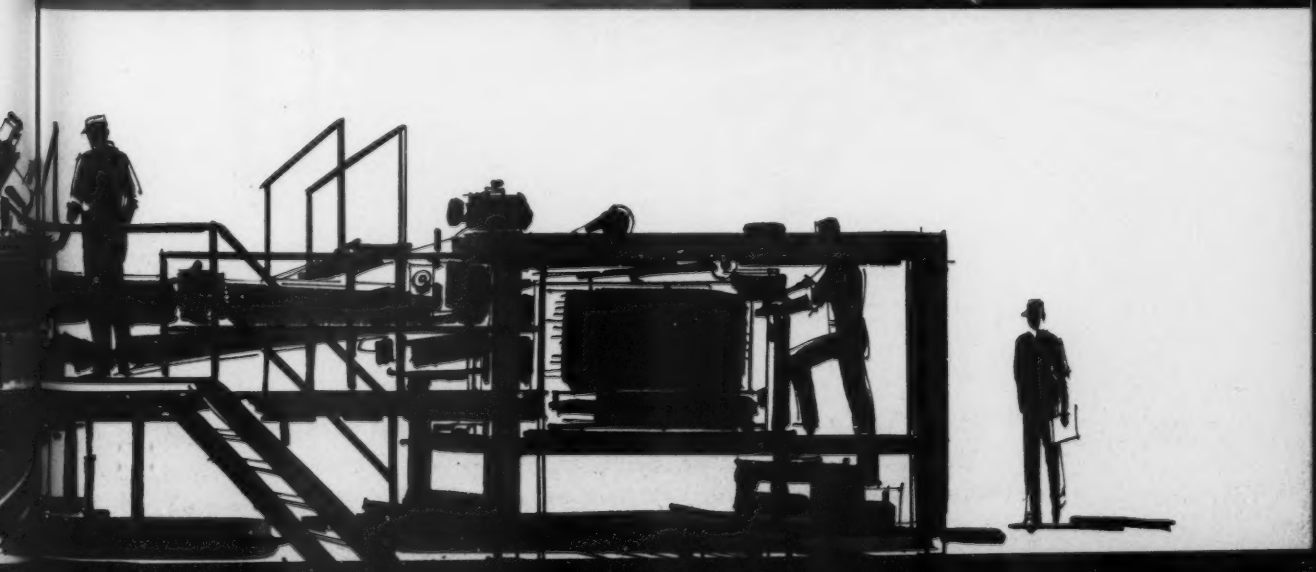
Automatic side removal system discharges platform contain
pile and skid to either side of layboy. While this discharging act
is taking place, a second platform and new skid are automatica
entering the layboy. The new skid is quickly raised into the desi
position by a two speed electric gearhead motor. Therefore,
downtime awaiting the removal of the finished pile and skid.
layboy itself is a compact unit, engineered to pile sheets of pa
with the greatest degree of accuracy. Sheet travel into the layb
proper is controlled by adjustable top tapes and bottom ro
fingers on each pile. Sheets are precision piled by joggers. The r
of jogging motion and length of the jogger stroke are controlled
means of an independent variable speed motor.











REVOLVING KNIFE "TORQUE LIMITER"

Torque limiter coupling in revolving knife drive is set to slip on overload and prevent damage to drive in case of "ball-up".

SHEAR-TYPE SLITTERS

Anti-friction top units with adjustable spring loading and SPLIT double edge bottom units assure clean cutting and eliminate slitter downtime.

AIR LOADED PULL ROLLS

Air loading of squeeze roll provides uniform control of nip pressure. Optional rubber covered drum roll insures the utmost accuracy.

CURL BREAKER

Removes curl by reve bending sheet around a sm diameter curl roll. Fully a justable, can be furnis with angle break in place curl roll.

The photograph below shows a recent installation at the Riegel Paper Corporation, Carolina Division, Acme, North Carolina.

"Riegel incorporated in their specifications certain 'MUST' features. They were: Clean-Cut Sheets within Tolerances; Direct Shipments from the Layboy, and High Production with a Minimum of Downtime.

The 'MOORE & WHITE' R-100 Cutter featuring Movable Backstand and side delivery Layboy has met these specifications and assisted the Riegel Paper Corporation in continuing to supply the best in sheeted paper and paper board."

THE MOORE & WHITE COMPANY

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West Coast: Stephen Thurlow Company, 1912 Minor Avenue, Seattle, Washington

75 YEARS

leading manufacturer of wires for

BOOK PAPERS

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are good wires!

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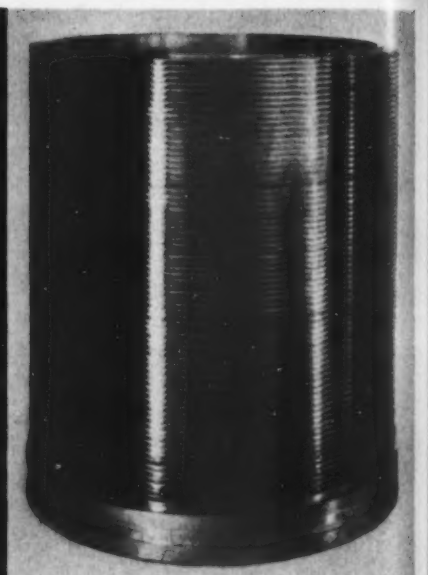
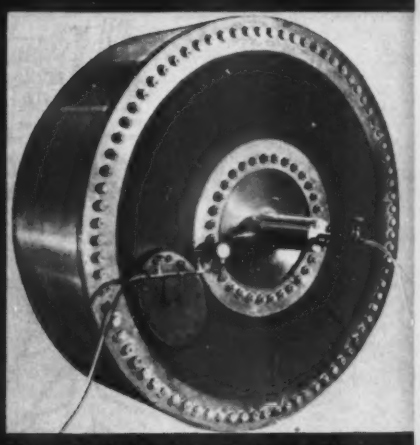
Profitable paper-mill applications...

Centrifugally cast, finish-machined roll, 12' long x 24" diam. Forged steel heads shrunk into place without cracking.



Centrifugally cast, finish-machined sleeves, 20¼" O.D. Thickness of fin .035"; height of fin .875". Weight, 289 lbs.

These two Ampco Cooling rolls replaced four cast-iron rolls — needed no chrome plating. Cleaning and maintenance practically nil.



Pilot-model Yankee drier, 8' diam. x 24" face. Body is Ampco 8 plate. Heads, Ampco 18 sand castings. Trunnions, forged Ampco 15.

Corrosion can be licked – from pH 3 up

– *with* AMPCO ALLOYS

Corrosion-resistance is just one characteristic of Ampco aluminum-bronze alloys. Physical properties far exceed those of the ordinary brasses or bronzes — resist wear and abrasion much longer. They provide high heat transfer.

You have flexibility in selecting the most economical form of production. Ampco alloys are readily sheared, bent, formed, deep drawn, and/or welded. They can be cast, extruded, forged, fabricated, and machined. (Ampco alloys take an excellent surface finish.) Also available as sheet and plate.

Call in an Ampco field engineer and get his unbiased recommendations. Write for bulletins.

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"Double-Seal"™ BALL VALVES*

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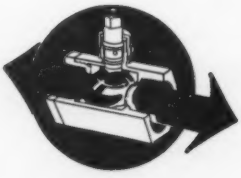
bring

VALVE VERSATILITY to Pulp and Paper Mills



Pulp and Paper Mill Service VERSATILITY:

Digester Blow, Bleach Liquor, Acid and Air Lines, Water Lines, Gas-Off Lines, Liquor Lines, Instrument Lines, Sampling Service — just to list a few among many services on which Jamesbury "Double-Seal" Ball Valves are in successful operation.

Size VERSATILITY:

Screwed End: ¼" through 3"

Flanged: 150# Series — ½" through 12"
300# Series — ½" through 8"*

*10" and 12" on application
*600# Series on application

Materials VERSATILITY:

303, 316 and Alloy 20 Stainless Steel, Carbon Steel, Bronze, Ductile Iron, Aluminum, PVC and Monel. Interchangeable seats and seals available in "Teflon", special "Teflon" compounds, Nylon, Buna-N, Neoprene, Hypalon and natural rubbers. Other materials on special application.

VERSATILITY:

— is the #1 reason for the acceptance and success of Jamesbury "Double-Seal" Ball Valves in the Pulp and Paper Industry.

For further information, write for Pulp and Paper Valve Brochure

JAMESBURY CORP., 52 New Street, Worcester, Mass.

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Introducing Western Canada's first fine paper mill — Island Paper Mills

E. N. WALTON
Development Engineer MacMillan, Bloedel & Powell River Ltd.

▶ Island Paper Mills is Western Canada's first fine paper mill. It features a Dominion 120-in.-wide removable fourdrinier. Vacuum is provided by two Sulzer blowers.

WESTERN Canada's first fine paper mill is now in commercial production and a new name has been introduced to the industry: Island Paper Mills.

Island Paper Mills is a division of MacMillan, Bloedel & Powell River Ltd. and is the latest unit brought into production as part of the Company's vigorous expansion and product integration program. The mill is located on Annacis Island south of New Westminster, B. C., on the Fraser River. The range of fine papers to be produced by this newest of paper mills will include bond, writing, mimeo, duplicator, tablet, envelope, book and offset.

Island Paper Mills' start-up on June 15, 1960, marked the fruition of an idea first conceived in 1958 by the Research and Planning Dept. of the then Powell River Co. Ltd. As a result of their studies, an order for a 120-in. fourdrinier machine was placed early in January, 1959. Sandwell & Co. were appointed consultants for this project.

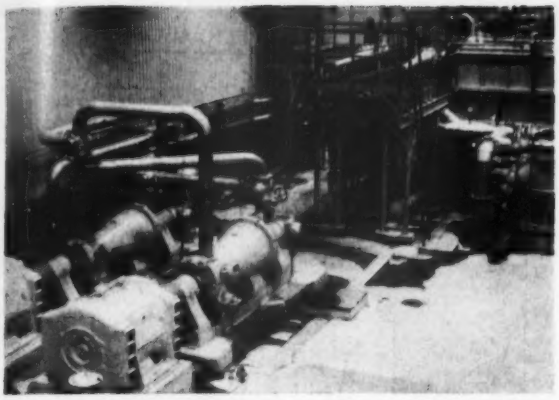
By the end of July, 1959, piling for the buildings had been completed and building construction had commenced under the supervision of building contractor Grosvenor-Laing (B. C.) Ltd., and by December 1 the buildings were completed. Sole plates were laid by January, 1960, and machine and equipment installations started under the general contract awarded to Flanders Installation Ltd., and electrical subcontractor C. H. E. Williams Ltd.

D. J. MacLaurin
Mill Manager

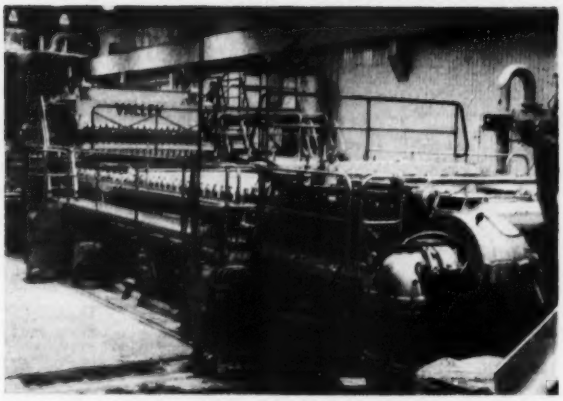
F. P. Hughes
Technical Director

K. E. Lachance
Production Manager

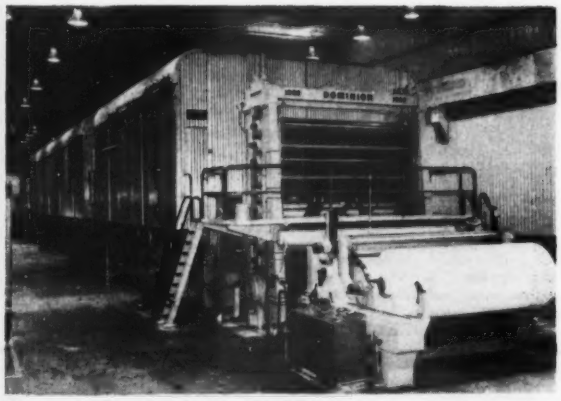
H. J. Webb
Office Manager



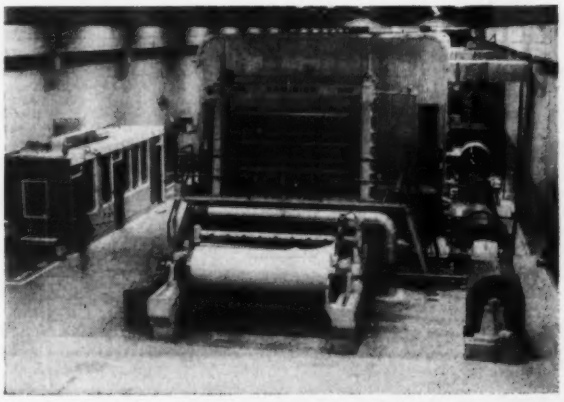
View of E. D. Jones 60-ton-capacity Standard Jordans and Bauer Bros. No. 623 centri-cleaners.



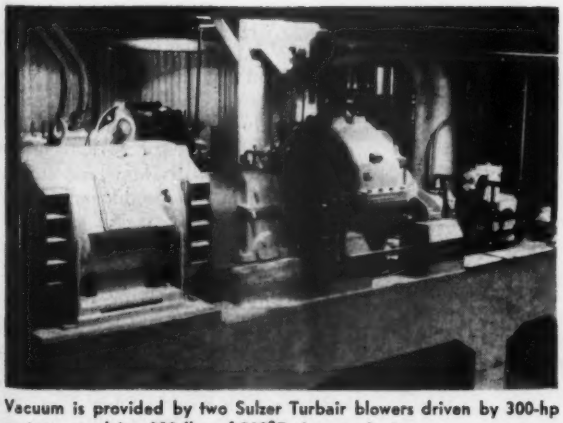
Dominion Engineering 120-in.-wide fourdrinier equipped with Valley Iron Works airloaded headbox.



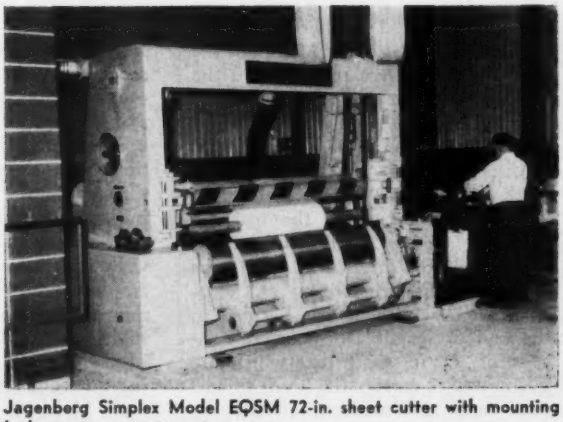
Ross Engineering hood is constructed of aluminum sheets and 3-in. fiber glass insulated roof panels.



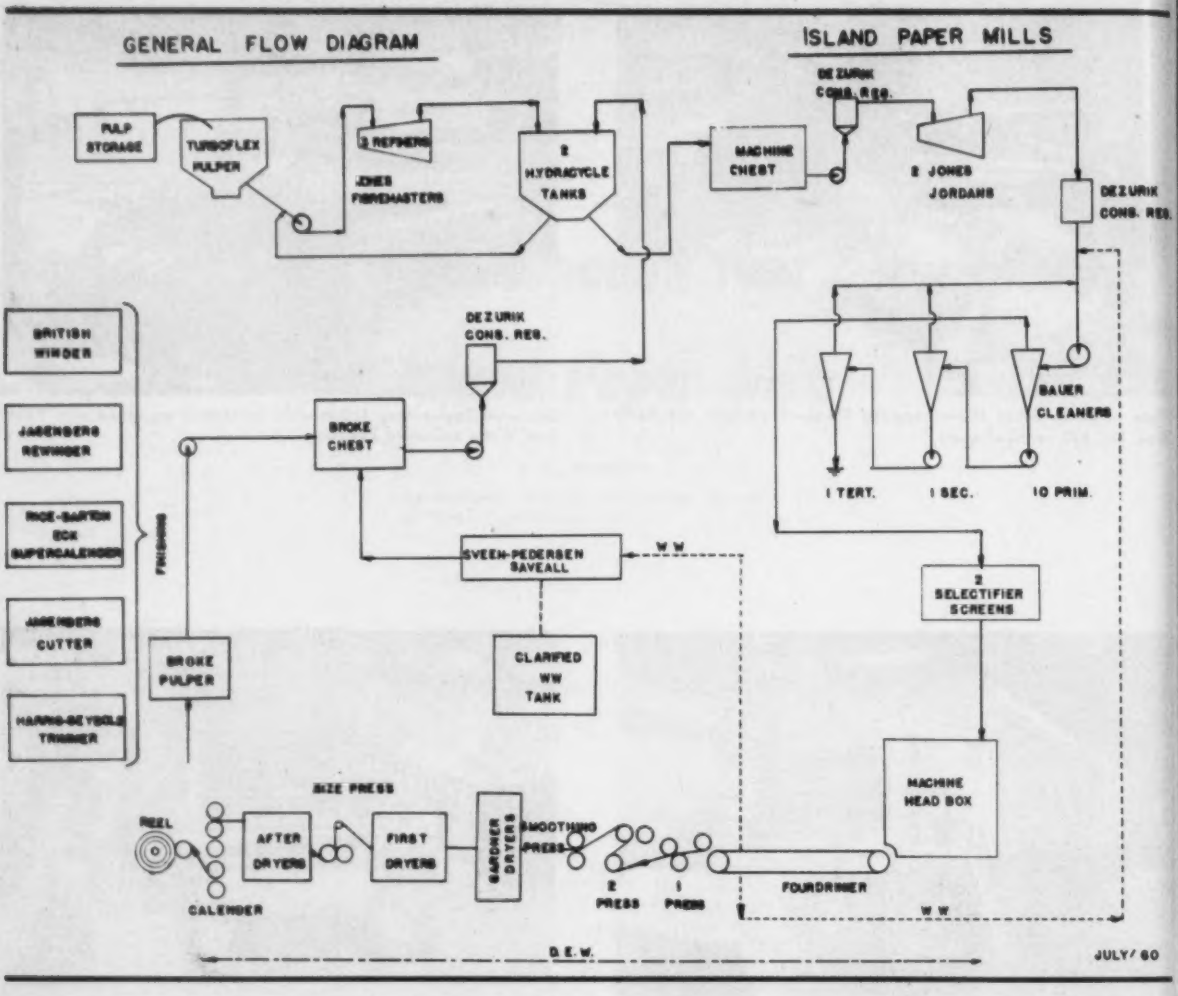
The paper machine drive is a mechanical spiral bevel, cone pulley line shaft system driven by a 500-hp. steam turbine.



Vacuum is provided by two Sulzer Turbair blowers driven by 300-hp motors, supplying 390 lbs. of 300°F air per minute.



Jagenberg Simplex Model EQSM 72-in. sheet cutter with mounting layboy, ream counter, etc.



Considerable study went into the site location. Always the mighty Fraser River entered the picture as an inexhaustible water source; and eventually a site was chosen on the Fraser River on the Annacis Industrial Estate. Annacis Industrial Estate is a development operated by Grosvenor-Laing (B. C.) Ltd. and it offers many advantages to Island Paper Mills, not the least of which were proximity to the Vancouver market and an ample source of water.

Since the subsoil of the mill site consists of loose to medium dense sands, it became apparent that piling would be required for the machine room and heavy machinery foundation. While the original intention was to support the structure on 711 creosoted timber piles, it was decided in the end to install 163 concrete caissons of 22 ft. shaft dia. which are guaranteed to carry safely loads of 120 tons each and are not affected by calender and supercalender vibrations.

The buildings were designed for minimum cost consistent with easy maintenance. The machine room is a two-story structure of 50 ft. width, 50 ft. height and 380 ft. length with reinforced concrete columns, beams and floor slabs. The finishing room and storage areas are single story 100 ft. wide by 20 ft. high by 240 ft. long, all on spread footings. Western red cedar from the company sawmills is used for the exterior vertical siding and for the roof deck.

A feature of the building construction is the extensive use of laminated timber beams. The standard outdoor bridge-type laminated beams coated with a clear sealer have a pleasing appearance and are completely dust free. Inside the buildings, enameled aluminum siding is brought down to a 6 ft. high dado wall of Spectra Glaze blocks. Spectra Glaze is a standard light weight aggregate concrete block with ½-in. layer of silica sand and resin bonded to the surface.

Mill management

Mill Manager is D. J. MacLaurin who is a graduate of the University of British Columbia and the Institute of Paper Chemistry. Most recently he was general superintendent and technical director of Gilbert Paper Company.

Keith E. Lachance is production manager. He is an honors chemical engineer graduate from Queens University, and has been associated with E. B. Eddy Co. since 1947, becoming successsively senior chemist for the specialty mill, technical assistant to the manager of that division, and finally superintendent of production standards and methods.

Frank P. Hughes is technical director. He is a graduate of London University, England. After graduation, he worked with A. E. Reed & Co., and came to Canada in 1951. He was technical supervisor with KVP at Espanola, and later with Sorg in Ohio. Until recently, he was senior scientist with the

Principal equipment installed at Island Paper Mills

Stock preparation

Agitators (2), one machine chest cartridge horizontal with four 48-in. adjustable-pitch blades; and one broke tank vertical with three 60-in. adjustable-pitch blades ..... Alexander Fleck Ltd.
Agitator (1), couch-pit horizontal, adjustable blades ..... Sherbrooke Machineries Ltd.
Brokemaster, Jones, equipped with two low-speed rotors ..... Alexander Fleck Ltd.
Centri-cleaners (12), 10 No. 623, 12-in. by 3-in. by 3-in. primaries; one No. 623 secondary; and one No. 606, 6-in. by 1-in. by 1½-in. tertiary ..... Bauer Bros. Co.
Consistency regulators ..... DeZurik Corp.
Hydracycle tanks (2), style No. 42, 10-ft.-dia. ..... Alexander Fleck Ltd.
Jordans (2), Jones "Standard", 60-tons/day capacity at 3 per cent consistency ..... Alexander Fleck Ltd.
Pulper, Turboflex batch-type, 2000-lb. capacity at 4½-5 per cent consistency ..... Alexander Fleck Ltd.
Refiners (3), Jones Fibermasters, with Accru-set control, 600-ton/day capacity ..... Alexander Fleck Ltd.
Selectifier screens (2), stainless steel No. 24-P ..... Black-Clawson (Canada) Ltd.

Paper machine room

Air system, heating and ventilating, aluminum open-type hood and high-velocity, air-jet nozzles; calender cooling ..... Ross Engineering of Canada Ltd.
Calender stack, 10-roll, air cooled ..... Dominion Engineering Works
Fourdrinier, removable, 120-in. wide wire, seven 8-in. suction boxes ..... Dominion Engineering Works
Gardner dryers (2), with 60-in. hoods ..... Rice-Barton Corp.
Headbox, airloaded, 3-pass, with two distributor rolls, auxiliary slice and hump ..... Valley Iron Works Co.
Moisture control system ..... Stamm Drying Controls Ltd.
Paper machine drive, mechanical spiral bevel, cone pulley, line shaft system ..... Dominion Engineering Works
Paper dryers (31), 60-in. dia., operating at 50 psi pressure ..... Dominion Engineering Works
Press section, suction first press, reverse suction second press, and smoothing press ..... Dominion Engineering Works
Reel, constant tension, 72-in. dia. rolls ..... Dominion Engineering Works
Saveall, Sveen Pedersen flotation, 700-gpm, with Aqua Spray Aeration tank ..... Alexander Fleck Ltd.
Steam control and dryer drainage system ..... Stamm Drying Controls Ltd.
Steam turbine, type E 125, 500-hp on paper machine drive ..... Canadian Westinghouse Co. Ltd.
Vacuum system, two Turbair blowers, type RC3A-4N-40, with 300-hp motors, extraction pumps, drop separators; 390 lb. air/minute capacity at 300° F ..... Sulzer Brothers Ltd.

Finishing

Cutter, Jagenberg Simplex, model EQSM, 72 in., with mounting layboy, ream counter and marker overlapping delivery ..... F. Drexel Co. Ltd.
Rewinder, Jagenberg type 35, 72-in. width, 3,300-fpm ..... F. Drexel Co. Ltd.
Supercalender, 10-roll, 64-in. face, Eck Model RCH open-sided ..... Rice-Barton Corp.
Trimmer, 100-in. fully automatic, Model MS-100 ..... Harris-Seybold Co.

Power

Motor control centers, Type A, Class 1 ..... Canadian General Electric Co.
Steam boiler, 30,000-lbs/hr capacity, Type FMD9-61, 400-psi at 750° F ..... Babcock & Wilcox Co. and Goldie McCulloch Ltd.
Substation, 3750 KVA, with HV and LV switchgear ..... Federal Pacific Electrical Ltd.

General

Flocculation-coagulation and filtering system ..... Northwest Filter Co. Ltd.
Piling, 163 concrete caissons, 22-ft. shaft dia. ..... Franki of Canada Ltd.

Marathon Research group at Rothschild, Wisconsin.

Harold J. Webb is office manager. He is a graduate of the University of British Columbia and was introduced to the paper industry in 1946 while employed by B. C. Bridge & Dredging Co. on No. 8 paper machine installation at Powell River. He joined Powell River nine years ago.

Stock preparation and handling

The stock preparation system is a batch system based on a 2000-lb., 25-minute cycle. Fig. 1 shows a simplified flow sheet of the system.

Metered dry pulp is loaded on a conveyor feeding the 14-ft. Turboflex batch pulper, of 2000 lb. capacity at 4½ to 5 per cent consistency, into which a measured volume of water has been dumped previously from an overhead dilution water tank.

After pulping, the stock is pumped into one of the two No. 42, 10-ft. dia. Hydracycle tanks from which it is circulated through three Accru-set controlled Fibermaster refiners, followed by an adding, diluting and blending cycle in the tank.

From the Hydracycle tanks stock is pumped to the machine chest equipped with a Cartridge horizontal type agitator featuring adjustable pitch blades. Stock is then passed through another consistency regulator to 10 No. 623, 12-in. by 3-in. by 3-in., primary, one No. 623, 12-in. by 3-in. by 3-in. secondary and one No. 606, 6-in. by 1-in. by 1-in. tertiary centri-cleaners. All centri-cleaners are equipped with vacuum reject system. Accepted stock from the centri-cleaners is given a final cleaning in two 3800 gpm, stainless steel No. 24-P selectifier screens prior to entering the machine headbox. The selectifier screens feature a rotating element with patented non-contracting air-foil bars to provide proper agitation and to keep screen holes open.

Clay can be added at the pulper or as a solution into the headbox system. Every effort was made, keeping in mind the size of the operation, for an automated and well instrumented set-up. All phases of the stock preparation system are controlled, timed and recorded at a central control board. A schedule of time and quantities can be programmed for each batch.

The paper machine

The 240-1200 fpm paper machine is a removable fourdrinier equipped with a 120-in. wide wire. It has a three-pass, airloaded headbox (maximum pressure 3 psi), seven 8-in. flat boxes, and a direct-driven couch with a double-compartment suction box and a drilled hole-pattern for silent operation. The headbox is equipped with two distributor rolls, auxiliary slice and hump.

The press section consists of a straight through suction first press, a reversing suction second press, and a smoothing press. Nip pressures in the first two presses are 300 pli., while the smoothing press has a nip pressure of 150 pli.

The main dryer section consists of two Gardner dryers equipped with 60-in. hoods, twenty three 60-in. dia. paper dryers, and four 60-in. felt dryers. The paper and felt dryers are designed to operate at 50 psi pressure.

The main dryer section is followed by a horizontal size press and the after-dryer section which consists of eight 60-in. dia. paper dryers and two 60-in. dia. felt dryers.

Following the after-dryer section, there is a 10-roll calender stack, a constant tension type reel capable of winding 72-in. dia. rolls, and a double-drum winder capable of handling 50-in. dia. rolls.

The finishing equipment includes a Type 35, 75-in. wide, 3300 fpm rewinder; an Eck Model RCH open-sided, 10-roll, 64-in. face, supercalender; a 600 fpm Simplex Model EQSM 72-in. sheet cutter equipped with mounting layboy, ream counter and marker overlapping delivery; and a 100-in. fully automatic spacer trimmer, Model MS-100.

Trim is pulped in a continuous Brokemaster, equipped with two low-speed rotors, and conveyed pneumatically to the broke chest which also receives the recovered white water fibers from the saveall. The broke chest is equipped with a vertical adjustment agitator which has three adjustable 60-in. dia. blades. The 700 fpm saveall is a flotation type equipped with an Aqua Air Spray Aeration tank operating at a pressure of 70 psi.

Paper machine drive

The paper machine drive is a mechanical spiral bevel, cone pulley, line shaft system equipped with Extremultus belting.

The line shaft is driven by a 500 hp, 850 rpm E125 steam turbine, designed for steam conditions of 390 psi at 750°F, and exhausting at 50 psi back pressure.

The turbine is equipped with a forced balanced relay governor which controls turbine speed within 0.25 per cent of the rated speed. A 6:1 speed range is obtainable from a motor and hand-operated speed changer.

Steam control and dryer drainage system

The steam control and dryer drainage system provides for:

1. Independent pressure control to the first two dryers which are equipped with Gardner high velocity hoods.
2. Automatic moisture control to the size press.
3. Automatic moisture control to the reel; the moisture control system on the after-dryer section is a split top and bottom system, permitting temperature variation between the top and bottom dryers for curl correction.
4. For drainage purposes, the 21 dryers in the main dryer section have been divided into a 7-dryer condensing section and a 14-dryer main section; as already stated, the dryers in the after-dryer section are split top and bottom, with separate steam supply to each section.

All operating controls, including both moisture controls, differential controls, Gardner dryer controls, etc., are mounted on a main control panel.

Basically the moisture control system consists of two pilot dryers, one ahead of the size press and one ahead of the reel, which are operated at constant pressure and are used as a moisture sensing device, so that variations in average sheet moisture change the steam consumption or rate of steam flow to the pilot dryers. This change of steam flow in turn forces the moisture control unit to change steam pressure in the section header.

Vacuum system

Vacuum is provided by two Turbair blowers, type RC3A-4N-40 equipped with 300 hp motors, extraction pumps, and drop separators. The blowers have a capacity of 390 lb. air per minute at 300°F.

This is the second such installation on this continent. The reliability of this system has earned it a wide and long acceptance in Europe. A unique feature of this system is the considerable quantity of warm air it provides for blowing over the sheet in the dryer section. This feature is combined with a fairly low power consumption.

Air system-heating and ventilating

The heating and ventilation system consists of: (1) an open insulated aluminum hood; (2) a felt supply system; (3) a high velocity air jet nozzle system; (4) a calender cooling system; and (5) a winder trim system.

The hood is divided into two sections covering the main dryer and the after-dryer sections. It is constructed of 3-in. fiber glass insulated roof panels and .051-in. aluminum sheets on each side. The side panels comprise two corrugated aluminum sheets with a 1/8 in. hardboard in the center. Side panels on the tending side can be lifted by trolleys for easy access and maintenance of the dryer section.

Air evacuation from the hood is from 16 cross pipes leading into a common plenum. All air and vapor is exhausted directly into the atmosphere by means of two vaneaxial fans located on the roof.

The high velocity air jet nozzle system provides high temperature, high velocity air into the paper draws. All air for the system comes from the blower vacuum system which supplies 300°F air. This air is blended with room temperature air in a damper proportioner so that air can be supplied to the paper draws at a preset temperature. If the high velocity system is shut down, all air from the blower is directed to the felt supply system.

Air supplying the felt system is taken from the machine room and passed through oil type air filters, heating coils and is then directed to the felts through 16 cross nozzle pipes which are of a new design to permit the placing of air to either side of the felt.

The calender cooling system takes outdoor or indoor air through proportioning dampers, delivers it to an air header at the bottom of the calender stack for calender cooling.

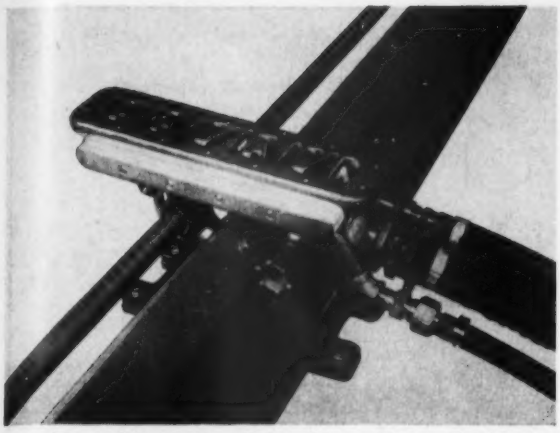
The winder trim system conveys trim from each side of the rewinder to a broke pulper approximately 150 ft. away. The main feature of this system is that all trim handled does not go through the fan but is handled through a Venturi injector.

Water supply

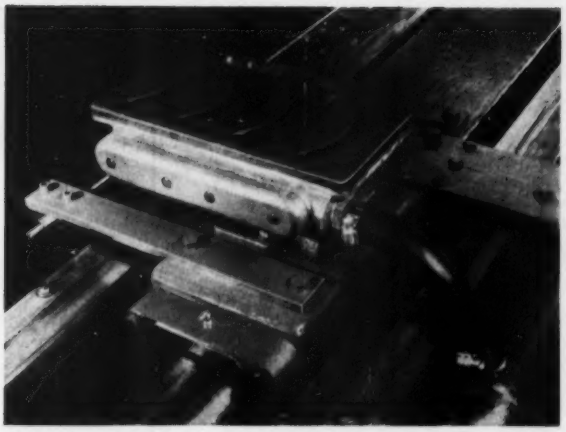
The Fraser River is subject to tidal variations at the mill site and, in the flood season, carries enormous amounts of debris. The variations in river levels are caused by an underlying salt water intrusion forced up from the ocean at high tide literally lifting the river. At the mill, this tongue of salt water is many feet below the surface of the river. Nevertheless, it was deemed prudent to skim the mill water off the top layer. Accordingly, a floating open-bottomed steel barge was designed and built to carry the suction ends of the intake pipes. From the barge, the pipes run to the pumphouse on the shore. Very extensive piling was necessary to hold the barge in place and to protect the whole system from freshet debris that drives past the mill.

The water treatment plant is basically a flocculating-coagulation and filtering system. Normally, the Fraser River is quite muddy and has a fair degree of color. At other times there is extreme turbidity consisting mostly of fine glacial silt (possibly in colloidal form) but of low color. Basically,

(Continued on page 726)



Press felt conditioning shoe, Vickery felt conditioner, Bird Machine Co.



Wet felt conditioning shoe, Vickery felt conditioner, Bird Machine Co.

The A.B.C.'s of felt conditioning

LAWRENCE H. BROWN
Service Engineer
Albany Felt Company

GREATER papermaker concern with felt cleaning, both chemical and mechanical, has brought about an ever increasing use of felt conditioning devices.

But basic to attaining maximum efficiency from such equipment as showers, suction pipes, Uhle boxes, Scofield conditioners, and Vickery conditioners, is an understanding of their construction and performance.

Vickery conditioners

For years, the Vickery conditioner unit consisted basically of one or more cleaning shoes mounted on an angle iron. The shoes slid back and forth on the iron, or "slide", and were driven by a screw thread concealed underneath. The unit's drive power was generally obtained from a belt attached to a felt carrying roll. This belt drove a reversing gear box which controlled the speed of the shoe traverse and the width of the traverse across the felt. When the shoe had traveled the pre-determined distance, the gear box reversed the direction of the screw thread's rotation, returning the cleaning shoe across the felt.

As machines became wider, it became necessary to alter the conditioner's construction to prevent deflection. More and more units are now being made from channel iron to obtain essential rigidity. The width of this iron varies with the machine width, the heavier iron naturally being used on the wider machines.

The cleaning shoes are mounted on a telescoping header and driven hydraulically. A remote control station is provided with the new units, so that shoe speed can be changed as necessary. The latest control cabinets not only have the automatic reversing feature, but also contain automatic speed controls.

Felt cleaning is accomplished by injecting water through a fine slot and then extracting it by suction through the vacuum openings of the shoe. This necessitates a vacuum and water connection on each shoe. The Jordan shoe has two vacuum connections, one at the toe and one at the heel of the shoe. Because the shoe is traversing, the connections to the vacuum and water outlets are flexible. This is done by means of hoses. Because of the amount of hose required, there is a definite limitation as to the area that can accommodate one of the old-style units. The new unit, mounted on channel iron, has eliminated the hoses and can be mounted in a considerably smaller space.

Over the years, the Bird Machine Company has accumulated a great deal of data as to grades run, the number of shoes, and the range of felt revolutions per traverse of a shoe. This has been compiled in table or chart form and is used as the initial reference point when figuring on a new installation.

As a general rule, machines up to 100 in. wide require one conditioning shoe. From 101 in. to 165 in., two shoes are required. For machines in the range of 166 to 240 in., three shoes are usually recommended. Four shoes are used on machines from 241 in. to 260 in., while machines wider than 260 in. utilize four, five, or six conditioning shoes.

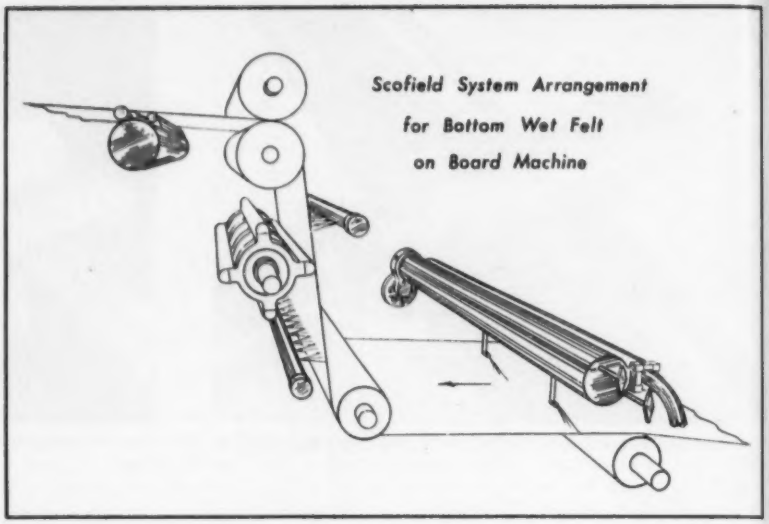
There is no hard and fast rule regarding the amount of water required for proper operation of the shoe. The water should penetrate the felt, causing a damp area on the traverse side of the felt; yet volume must be small enough so the water is completely removed by the vacuum area. This means water pressure and volume will vary considerably from mill to mill because of different mill conditions and styles of felts. While some mills use as much as 20 gal. per minute per shoe, others use as little as eight gallons. The average is around 12 gal. per minute per shoe.

The volume of air required to operate the conditioners depends upon the type and style of shoe. Based on 10-in. vacuum, a Jordan shoe requires 100 cu. ft per minute of air for proper operation. The Wet Felt, or "hot dog" shoe, is designed for 150 cu. ft per minute per shoe. The old Vickery shoes were of various sizes and required varying volumes of air. The 12-inch shoe was designed for machine-speeds up to 500 fpm and uses 40 cu. ft of air per minute. The 16-in. shoe uses 60 cfm at speeds of 500-1000 fpm. Above speeds of 1000 fpm, the 20-inch shoe was recommended and uses 80 cu. ft of air per minute. The Jordan shoe measures 18 in.

The traverse of the shoe is dependent upon the width of the water slot and width of felt cleaned. The Vickery shoe has a water slot ¾ in. long. This shoe traverses ½ in. across the face of the felt for each revolution of the felt. The Jordan shoe has a two-inch water slot and traverses 1¾ in. per felt revolution. The new wet felt shoe has a five-inch water slot with a traverse of 4½ inches per felt revolution. Wet felt shoes on bottom felts are spaced so the felt revolves 12 times before the shoe repeats over the same felt area. Top felt conditioners are designed for a maximum of 20 felt revolutions before repeating.

Bird Machine Company is continually carrying on research directed toward finding the ideal material for covers. They have experimented with several designs and a great number of materials. A Ryertex cover used on a heavily clay-filled sheet should have a life of about 60 days. Under normal conditions, a mill can expect a set of covers to last from six months to a year. The old Vickery shoes were brass. Presently Ryertex is the standard box cover material. Teflon has been tried, but was not satisfactory. While in most cases Teflon works well on flat boxes where there is plenty of lubrication, it wears out rapidly on unlubricated felt conditioning shoes or suction boxes. There is considerable difference in opinion as to the value of nylon shoe covers. One mill manufacturing a heavily filled sheet wore out a set of nylon covers in nine days, while another mill operating under similar conditions claimed to have run nylon covers for 18 months. It is still being evaluated.

Stainless steel has also been used for covers, but it has caused undue wear on the felt. These covers also mark the felt if left in contact with it over the weekend. However, in the asbestos-cement field, where the furnish is very abrasive, hardened stainless steel is the standard cover material.



Scofield System Arrangement for Bottom Wet Felt on Board Machine

Shoes should not be set into a felt because this causes wear. When adjusting conditioning shoes on a machine, the shoes should be brought up until they barely touch the felt, then backed off a fraction of an inch, allowing the vacuum to draw the felt down to the shoe.

Scofield felt conditioning system

The Scofield felt conditioning system is a three-unit package: the automatic felt conditioner, the Venturi throat suction pipe, and a high-pressure shower.

The mechanism of the Scofield conditioner is simple but sturdy. It consists of a number of nozzles that direct a jet of water against the felt, and a steel casing that houses the operating components. The number of nozzles required depends upon the speed of the machine and the width of the felt. These nozzles do not come in contact with the felt, but are placed four inches above it. Nozzles are spaced so that as they traverse back and forth across the felt. Complete coverage is thus assured.

The nozzles are adjustable, allowing the spray to be directed toward the felt at an angle best suited to the requirements of the installation.

A common driving arrangement consists of a V-belt pulley and belt, driven from a convenient felt or press roll journal. A variable speed package drive may be furnished for operating conditions where it might be advantageous to alter the speed of the nozzle travel to suit changing operating requirements.

Auxiliary manual controls are provided for use when concentrated action is needed to clean spots or streaks. The conditioner resumes automatic operation as soon as the operator releases the manual control.

A water-steam injector is furnished for attachment to existing steam and water lines. A special arrangement offers control of the temperature, pressure, and velocity of the steam and water that sprays from the nozzles in a broad, thin flare.

A "stopped motion" warning device is also offered as auxiliary equipment. This device is recommended as a safety measure, especially for use on larger high-pressure units. If the motion of the cleaning jets is accidentally stopped for any reason, the machine operator is notified at once by a horn.

Sandy Hill Brass and Iron Works maintains a table of existing installations giving speed of travel, number of nozzles, and other pertinent information such as type of felt and machine speed. This table is used as a guide for each new installation.

This conditioner is designed for application on almost any type of felt, but it probably has found widest acceptance where open felts are being used as in board and roofing mills. The Scofield conditioner is put on the inside of the felt and is set so that the spray passes through the felt to loosen or wash out foreign materials collecting in the web or on the nap on the paper side of the felt. It has been our experience that this conditioner is particularly effective when used near a Mt. Hope roll where the felt is expanded and open.

The shower is connected directly to a fresh water line. Where more pressure or warmer water is needed a steam and water injector is placed

(Continued on page 726)

Introduction to the rheology of paper coating

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Rheology, which deals with the flow and deformation of matter, is of great interest to the coated paper industry. In a series of articles beginning with this issue, the practical application of rheology in paper coating will be discussed.

PAPER manufacture and paper coating were practical arts until several decades ago. Then technologists were asked to make the needed advancements in the manufacture of paper to meet the mounting qualifications of the consumers of paper. Only a few years ago the technologists began to study intensively the manufacture of coated papers. Rheology is now called upon by the industry to solve problems dealing with the mechanical properties of both papers and coating mixtures.

Rheology is not a new science. Many basic principles of rheology have been described in the literature and text books for more than a hundred years. As a matter of fact, Sir Isaac Newton made observations on types of flow of importance to the paper coater and one flow was actually named after him.

Rheology deals with the flow and deformation of matter. Flow is usually associated with liquids. They assume new positions through changes in mass points to represent new equilibrium positions. These progressive changes are not recovered and energy cannot be stored, although forces are required to cause infinitesimally separated equilibrium positions. Liquids take upon themselves the shape of the boundaries enclosing them. Deformation, on the other hand, is the relative displacement of some parts of a body with respect to other parts. Energy is required to do this and is stored. Forces are required to keep the body in the deformed state.

One of the most important single qualities in coating base stock and in coating mixtures is uniformity. This matter will receive prime attention throughout this series of discussions. Quite a bit has been written about the behavior of papers under stress. Much more information is needed in order to form clear conceptions of the strains and stresses within a sheet of paper and how they respond to various outside influences.

Practical application of rheology

Rheology is of great interest to the coating chemist, especially when machine coating is concerned. It is used to determine flow characteristics, to determine how and where films split in the application station, and it is used to determine the leveling qualities of the coatings on paper. It shows the behavior of the coating during drying as well as other general features which will make the coating applicable or non-applicable on the various types of coating machines.

Various aspects of rheology might be used in this consideration. Not enough is known about the practical application of rheology to correlate it with the theoretical in its application to the coated paper industry. It is for that reason, therefore, that this study will deal primarily with applied rheology since this will be more useful to the average coating technician than the theoretical.

Measurement of viscosity; use of flow curves

In dealing with practical rheology of coating mixtures the first consideration that needs to be understood is the measurement of viscosity. Various terms are associated with the viscosity of a coating mixture. Absolute viscosity is measured in dynes per square centimeter to produce a velocity gradient of one centimeter per second per centimeter. In absolute viscosity a force of one dyne per square centimeter gives a viscosity of one poise. Ordinarily the viscosity is given in centipoises in order to avoid values less than one. In some coating mixture studies the apparent viscosity is used and this is obtained by dividing the shearing force by the rate of shear. In other cases the relative viscosity is used and this is the relation between the viscosity of the liquid and water at the same temperature. Thus, if the viscosity of the coating is measured at 20° C., the value will be the relative viscosity because water has a viscosity of one centipoise at that temperature.

In the early stages of coated paper manufacture the viscosity of the coating mixture could be taken by timing its flow from a cup with a definite sized hole in the bottom. The newer coating machines and methods of application have outmoded this type of measurement. Today it is necessary to have a graphical representation of the flow of the coating mixture under different stresses. It is only with the flow curve that the coating mixture

can be completely characterized and a prediction made on how it will perform on the coating machines. Special equipment and trained technicians are necessary to produce reliable flow curves.

It is customary to talk about the working properties of a pigment-coating mixture. The working properties are determined by their flow characteristics. It is not uncommon to hear such terms as length, shortness, false body, viscosity, tack, thixotropy, yield value etc. Unfortunately, there is no guarantee that when these terms are used in different coating mills that they will describe exactly the same characteristics. This is another reason why flow curves need to be developed so that a more universal understanding arises on the different types of flow properties which the mixtures must have to work properly under various conditions.

The so-called cup viscometer has given way to the rotational viscometer. In this latter type the cup may revolve under some conditions while in others a bob within the cup may revolve. Various speeds are used so that the shear rate can be from very low to extremely high. In no case can we approach the shearing rate found on the high speed coating machines in the paper mill. There is no one viscometer which will give universal results and the proper characterizations of the coating mixtures. In some cases the low shear viscometers do a satisfactory job, while in other cases it becomes necessary to use higher shear to get a clear understanding of the types of flow required. In quite a few cases empirical methods are used for determining whether or not the coating mixtures will work satisfactorily on the coating machines. If the production of the coating is handled carefully enough, then it is entirely possible to get reliable results with these various empirical methods. However, it might be said that these work satisfactorily for control methods in general, but they can never be a research tool to gain a better understanding of the overall problem or to develop newer types of coating mixtures for the manufacture of coated papers.

It is necessary to study the kinetic potentials which involve the transfer of momentum from rapid to slow moving layers within the coating mixture. It is also necessary to study the intermolecular forces between particles. In making these types of studies one gets a better understanding of the hydrodynamics of the coating mixtures. The overall picture of hydrodynamics is the result of a number of forces active within the system.

TYPES OF FLOW

Not long ago the coating technician was concerned only with very fluid coating mixtures in which the pigment particles had very little influence upon one another. The force of gravity was sufficient to cause flow in these systems. Present day high solid systems have brought energy considerations to the attention of the coating technologists. In meeting the requirements of the newer coating machines one can no longer make the required changes in flow characteristics simply by using more or less water in the system. Therefore, it is hoped that the science of rheology, when applied in the practical sense, can be of considerable help in solving certain difficulties now confronting the coating technologist.

Laminar or Newtonian flow

The most simple flow system known to the coating technologist is laminar flow and it is also called Newtonian flow. In this type, the flow of a liquid over a solid surface shows a gradient of velocity at various distances away from the solid surface. The fluid at the boundary is stationary and as one moves farther away from the boundary, the flow in the adjacent layers becomes greater as the distance from the solid surface becomes greater. This also occurs in flow through pipes in which the layers adjacent to the walls of the pipes are stationary and flow is most rapid in the center of the pipe. This is one example of the transfer of energy through the momentum of the fast flowing liquid to the layers that flow more slowly.

In the Newtonian system the rate of shear is directly proportional to the shearing stress. Therefore, it is possible to make one viscosity determination to characterize the entire flow system. Newtonian flow is the only flow in which this is possible. Gravity is the usual force required in Newtonian flow to show its characteristics. Materials showing Newtonian flow are usually regarded as true liquids such as water, glycerin, light oils, solutions of small molecules, etc. They are composed of free flowing molecules or particles.

An important feature of the Newtonian system is that there is no rigid internal mechanism. The particles do not interfere with each other, nor do they exert any apparent influence. Small suspended spheres or particles may be regarded as a homogeneous liquid surrounding the larger spheres. Under shear each sphere or particle must spend a considerable fraction of its time in very close proximity with other spheres even in dilute suspensions. As the concentration of particles is increased, some particles may form clots of three or more and they, in turn, would rotate throughout the mixture as one particle. It is believed that van der Waals forces are active between these particles or between the particle clots. If the particles or molecules are elongated, then the dilution must be relatively low to show the Newtonian type of flow. All Newtonian systems decrease in viscosity as the temperature of the system increases.

Pseudoplastic flow

When a system under study shows shearing rate increases faster than the application of shearing stresses, it is referred to as pseudoplastic flow. In this type of system, flow begins with a very small shearing force. These systems are ordinarily characterized by having particles or molecules of considerable length. Shearing disturbs their random orientation and aligns them in the direction of flow which reduce the effective size of the particle. In this type of system the viscosity of a suspension of prolate particles is greater than that of a suspension of spheroidal particles at the same concentration.

It should be emphasized that the psuedoplastic system does not form an internal structure, but that the particles or molecules are present in random orientation. A light mineral oil with a rather short molecule will exhibit Newtonian flow; if the chain length of the hydrocarbon is increased it will become pseudoplastic. If a pseudoplastic system is diluted sufficiently so that the orientation of the particles no longer affects the flow of the system, then it will become Newtonian. Examples of pseudoplastic flow are solutions of some high polymers, cooked starch pastes, casein and soya protein solutions, etc.

Plastic flow

When molecules or particles become more closely associated than they are in Newtonian or pseudoplastic systems, they may form connected structures which give rise to plastic flow. A system exhibiting plastic flow will not flow until the shearing stress exceeds a certain minimum force. It acts as if a barrier had to be surmounted before flow can begin. The minimum stress or force required to cause flow in such a system is known as the yield value. In the true plastic system, laminar flow will take place once the yield value stress has been exceeded. At stresses lower than the yield value the material is not sheared uniformly by these forces and this region of flow is known as plug flow.

A plastic system contains particles which touch each other and form a network or structure within the system. In order to make such a system flow it is necessary to break the contacts between these particles or in other words to break the structure. That this is done rather rapidly is indicated by the fact that laminar flow takes place once the yield stress has been exceeded.

It has been observed that the greater the degree of flocculation within the system the higher will be the yield value. This has led some investigators to believe that the force of flocculation is the cause of the yield value. Others believe that some of the externally applied force or energy necessary to overcome friction between the rotating particles to be a cause of the yield value. If this is true, then the inertia of the particles must also be considered. Examples of plastic flow are certain types of paints, printing inks, pigment dispersions, etc.

Dilatancy

A dilatant system shows increased resistance to flow as the shearing stress is increased. This property alone, however, cannot characterize dilatancy. The expression dilatancy can be applied only to a system which expands as the result of shear. There are no attracting forces between the particles in a dilatant system. After shearing it will revert to its original condition only if allowed to stand without disturbance. The force of gravity causes flow when the shearing stress is removed. It appears dry under shear, but will appear wet and flow freely when not disturbed.

The viscosity and friction of a dilatant system may be affected by attracting forces betwen the particles. The smaller the attracting forces, the lower will be the viscosity. In this type of system a certain amount of shear seems to be necessary to bring the particles into continuous contact. Thus shear is not a matter of any viscous character, but rather friction between particles in contact with each other. There is no breakdown under stress so that the viscosity of the dilatant system cannot decrease under stress.

The particles in a dilatant system settle to a state of minimum voids. Any disturbance of the system causes a rearrangement of the particles, giving a greater void volume. An increase in the space between the particles causes the suspending liquid to be drawn into the mass as the total volume increases. Stirring or shearing a dilatant system expands the voids so that there is insufficient liquid to fill them, packing the particles so that the system looks dry and acts like a solid.

Deflocculation of the particles seems to be a prerequisite for dilatancy. Deflocculated particles settle to minimum voids if the suspension is concentrated enough. As a matter of fact, when the particles in the Newtonian system settle, dilatancy usually occurs in the sediment. The type and amount of deflocculating agent used may determine the concentration of the particles in the total system necessary to cause dilatancy. The closer the particles pack, the higher will be the concentration when dilatancy takes place.

One may expect that the size and shape of the particles determine the concentration at which dilatancy becomes evident. Irregularly shaped particles usually become dilatant at lower concentrations than the critical pigment volume.

Dilatant systems are always crowded systems. The particles may show Brownian movement. A very small amount of suspending medium added to a dilatant system can upset and destroy it, and transform it into a Newtonian system.

A dilatant system may be visualized as follows: the suspending particles settle with sufficient liquid between them to lubricate them so that they will flow if poured. If agitated vigorously, the particles will pack, forcing the liquid out from between them so that the fluid is no longer able to fill the spaces between the particles.

A common way to observe dilatancy is to stir household starch into water until approximately 50 per cent by weight of the suspension is obtained. At this point the suspension will pour freely from one container to another, but if stirred vigorously, it will solidify and become dry until the stirring stops. Other examples of dilatancy are moist sea sand, quick sand, and completely deflocculated high solids pigment suspensions.

Rheopexy

Rheopexy is another type of flow where the rate of shear decreases proportionally to the shearing force applied. It may be considered a form of inverted plasticity in which the viscosity increases with shear. In rheopexy there is formed a structure which seems to be facilitated by shear if the shearing force is small. There may even be some coagulation of particles as they approach each other by the movements of the suspending liquid. It may occur in rather dilute suspensions and may also depend upon the anisotropy of the suspended pigment particles.

Thixotropy

All of the flow systems described above, when plotted, will show curves under increasing and decreasing forces which superimpose upon each other. In a thixotropic system the curve as the shearing force is increased does not coincide with the curve as the shearing force is decreased. Therefore, it is described as a flow associated with an internal structure which is destroyed temporarily by stirring or shaking, but reforms upon standing. Sometimes it is referred to as a gel-sol-gel transformation.

A gel is a colloidal disperse system with some of the properties of a solid which are set up in the system by the formation of a structure. The properties of a solid are approached because of the network formed by one or more components of the system. The bonds formed in such a system between particles may be either chemical or physical. Gels are not to be considered solidified suspensions of particles because in reality they are not crowded systems. Macromolecules form structures very readily.

Gel formation may be a spontaneous swelling of a substance when brought into contact with a solvent. Coherent structures may be formed by the coagulation of particles.

A sol is a colloidal disperse system with the properties of a liquid. This type of system has no structures so that the resistance to shear is very low.

In the thixotropic structure the undisturbed system of particles forms open structures and it becomes solid when the structure becomes continuous throughout. Flow arises only when the structure is broken at the yield point. In certain cases of anomalous flows, plasticity may cause flow modifications which are not clearly understood. In some suspensions there may be elastic deformation before flow begins which may be due to the looseness of the structure formed. However, there is a complete breakdown of the structure as the yield point is reached.

Anistropy of particles usually enhances thixotropy. They may be branched or filamentous structures. Sedimentation in a thixotropic system depends upon the time required for structure reformation after shearing, and it is usually seen only in structures that reform very slowly. The continuous structure reforms almost instantaneously when the disturbance has ceased if the concentration of the particles is high and the forces of attraction strong. In other cases, finite time is necessary for the reformation of the structures. The particles in a thixo-

tropic suspension appear to be non-attracting so that the shear stress drops to zero once the yield stress has been exceeded.

There are several theories on the causes of the thixotropic structure. Flocculation seems to be a prerequisite, but it may not be the direct cause of thixotropy. The lyosphere theory holds that the particle forms an envelope of the suspending medium which may be as thick as 100 molecules and this envelope is destroyed under stress. In the scaffold theory it is believed that a loose structure is built with the suspended particles. This type of structure may be filamentous and it may have some things in common with the elastic structure. The micelle theory holds that there is an alignment of the particles which can be broken by stress.

Needle and disc shaped particles produce more thixotropic effects than do spherical particles. A suspension of a single component is less likely to be thixotropic than a system made up of more than one kind of suspended particles.

As indicated before, when the shearing force is plotted against the shearing rate the curves with the shearing forces increasing and decreasing do not coincide. This forms what is known as the hysteresis loop. The size of the loop is used to determine the degree of thixotropy. The narrow hysteresis loop indicates rapid reformation of the structure.

Thixotropy is measured by determining a complete loop or it might be measured by the single point method in which the time for reformation of the structure is measured after it has been broken by agitation. A rather simple method for ascribing a numerical value to thixotropy is to divide the viscosity at a low rate of shear by the viscosity at a high rate of shear. This can also be used to index other types of flow since thixotropic flows will have a value of more than one, Newtonian flows will be one and dilatant flows will be less than one.

False body system

Sometimes the hysteresis loop does not conform to the normal concepts of the thixotropic system; that is, the shear stress does not drop to zero when the yield point is reached. This is called false body. A false body system behaves as an elastic solid. If the strain is kept constant, relaxation flow will occur at the yield point because of local breakdown in the continuous structures. If however, the strains are violent enough to break the structure completely in a very short time, the flow of the false body system will show the pattern of the suspending medium and may not be too different from true thixotropy. If this is always the case, then two systems which show thixotropy and false body in the laboratory on low shear viscometers may not show any differences on a coating machine under extremely high shear.

Under laboratory observation a false bodied system maintains its shearing stress after the yield stresses have been exceeded. They also retain their shearing elasticity or rigidity while under agitation. As stated above, the hysteresis loop in false body systems can be obtained most easily with suspensions at low rates of structure reformation and under low shear. When the rate of reformation is equal to or less than the reciprocal of the relaxation time, then the replacement of structure linkages which break down during relaxation cannot occur instantaneously.

Transformation of various flow systems

It is possible to take water, pigment particles, a dispersing agent, and a flocculating agent to set up and transform these various systems into each other. As particles are added to water in the presence of a dispersing agent a Newtonian system is produced. If the deflocculation is complete, it will form a dilatant system as particles are added to the system to the point where dilatancy can occur. If the flocculation is not too complete or if the particles are elongated, the addition of more particles may form a pseudoplastic system. As has been noted before, both dilatant and pseudoplastic systems can be transformed back to Newtonian systems by the addition of water. If additional particles are added to the pseudoplastic system, it may be transformed into a plastic system by the formation of an internal structure. A plastic system will be transformed into thixotropy if the particles are flocculated to a certain extent. If the thixotropic system is of such nature that deflocculation can be induced, there is a possibility that it might be transformed into a dilatant system. In some cases the flocculation of the particles in the dilatant system may lead to thixotropy. It should be remembered also that plastic and thixotropic systems may be transformed into Newtonian by the addition of water.

The foregoing discussion has centered around forming a mental picture of the space relationship of particles suspended in an aqueous medium. Considerable work is necessary to clarify many of the phenomena one sees when working with such systems in the laboratory or in the coating mill. On the other hand, the pictures of the various systems are clear enough to be used in a practical way in the formation of coating mixtures that will work on different types of coating machines and upon different types of papers. The principles set forth in this discussion will be used repeatedly in the remainder of the series on the rheology of paper coating.

Island Paper Mills

(Continued from page 720)

the treatment is one of chemical mixing and coagulation which is referred to as "hydraulic mass mixing." The plant consists of a circular mixing and coagulation section in the center with the settling section around the perimeter. There is no mechanical mixing action, simply enough dwell time is alllowed to permit settling out of the floc and decanting of the clear water. From the settling basin, the water flows to pressure sand filters. Backwashing is carried out whenever needed. After filtering, the water is stored in the stillwell, from which it is pumped to the mill.

Felt Conditioning

(Continued from page 722)

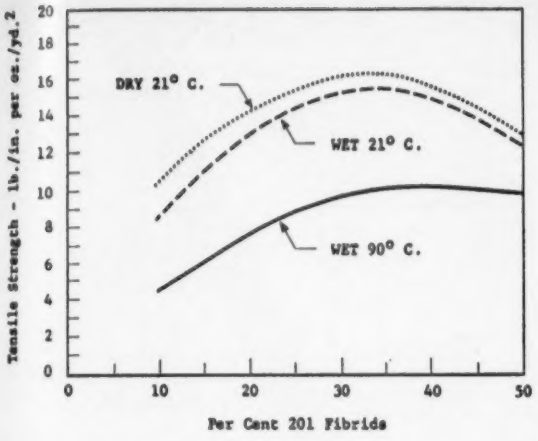
in the water line. The size of the injector will be governed by the length of the pipe, the number of nozzles and the gallonage required. The size of the nozzle orifice is dependent upon the use. Under adjustable control, the nozzles deliver high pressure, high velocity jets with an interlacing flare of spray. This shower loosens dirt and flushes away a great deal of the soil that was loosened by the conditioner. It also thoroughly saturates the full width of the felt, providing a vacuum seal at the suction box.

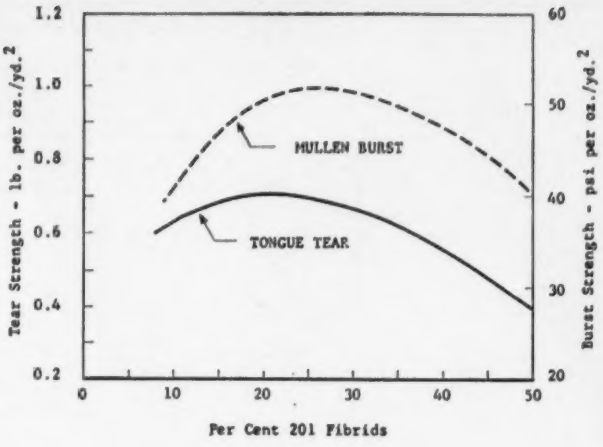
The Scofield venturi throat suction pipe is used to produce a stationary suction effect using low vacuum. It removes water, dirt, and paper fibers. This pipe is also suitable for use on a felt to dry up both the felt and the sheet.

Sealing heads at each end of the orifice are adjustable for altering the deckle.

The pipe can be installed to meet any angle of felt run with the exception of a directly inverted position.

(Continued on page 728)





Some new developments in synthetic fiber paper*

R. A. A. HENTSCHEL

Product Development Manager
E. I. du Pont de Nemours & Company, Inc.

PAST work with synthetic fibers in paper has pointed out that these fibers have no inherent bonding power and that separate binders must be used to tie the fibers together. It became clear that a new binder system was needed, designed specifically for the synthetic fibers. Du Pont has developed a new family of binders which now meet these needs. This new binder system has been given the generic name, "fibrid", and products made from fibrids and synthetic fibers on paper making equipment have been given the generic name "textryl".

Fibrid binder system

Fibrids are fibrous synthetic polymer particles, whose morphology is somewhat similar to beaten wood pulp. Because of their form, when combined with synthetic fibers, they give a furnish which behaves very much like conventional pulps on the paper machine. The wet-web strength of the waterleaf as laid down on the wire is roughly the same as that of a kraft waterleaf. When the webs are dried, they develop adequate dry sheet strength for winding up and subsequent handling. Full sheet strength is developed by a hot calendering operation on the dried sheet in which the binder is fused. Fibrids can be made from virtually any synthetic polymer. It is therefore possible to prepare fibrids which are chemically similar to the fibers which they are to bond.

Calendered fibrid-bonded sheet properties

Fig. 1 shows the relationship of binder content to tensile strength for a textryl made from ¼-in. 3 denier fiber and calendered at 400°F. Curves are given for dry strength and wet strength at room temperature, and wet strength at 90°C. Tensile strength is given in lbs./in. per oz./yd.² As the fibrid content of the textryl increases, the strength increases to a maximum of about 16 lbs./in. per oz./yd.² at about 30 per cent fibrid and then falls off.

The tear and burst strength as a function of binder content are given in Fig. 2. These values are again given for a unit basis weight. Tear, measured as tongue tear, is given in lbs./oz./yd.² and Mullen burst in psi/oz./yd.² As the fibrid content is increased, these properties also increase to a maximum and then fall off. However, the maximum is reached at somewhat lower fibrid contents than maximum tensile strength.

Manufacture of textryls

Stock preparation. Synthetic papermaker's staple fibers can be readily dispersed in water with mild agitation at slurry consistencies of 0.05 to 0.1 per cent. Fibrids are supplied as a damp cake of about 20 per cent solids. They are dispersed in water in a Hydrapulper at 1 to 3 per cent consistency and run through a Bauer disc mill to effect the final opening of the fibrous particles. Freeness can be reduced in this step, if desired, with closer settings of the discs. It is desirable to prepare fiber and fibrid stock separately and mix them just prior to feeding to the headbox to minimize fiber flocculation. Since the fibers are relatively very long, high dilutions are used in the headbox. Fig. 3 gives a flow diagram for one system which has been used.

*Abridged from a paper presented at the 15th Plastics-Paper Conference of TAPPI.

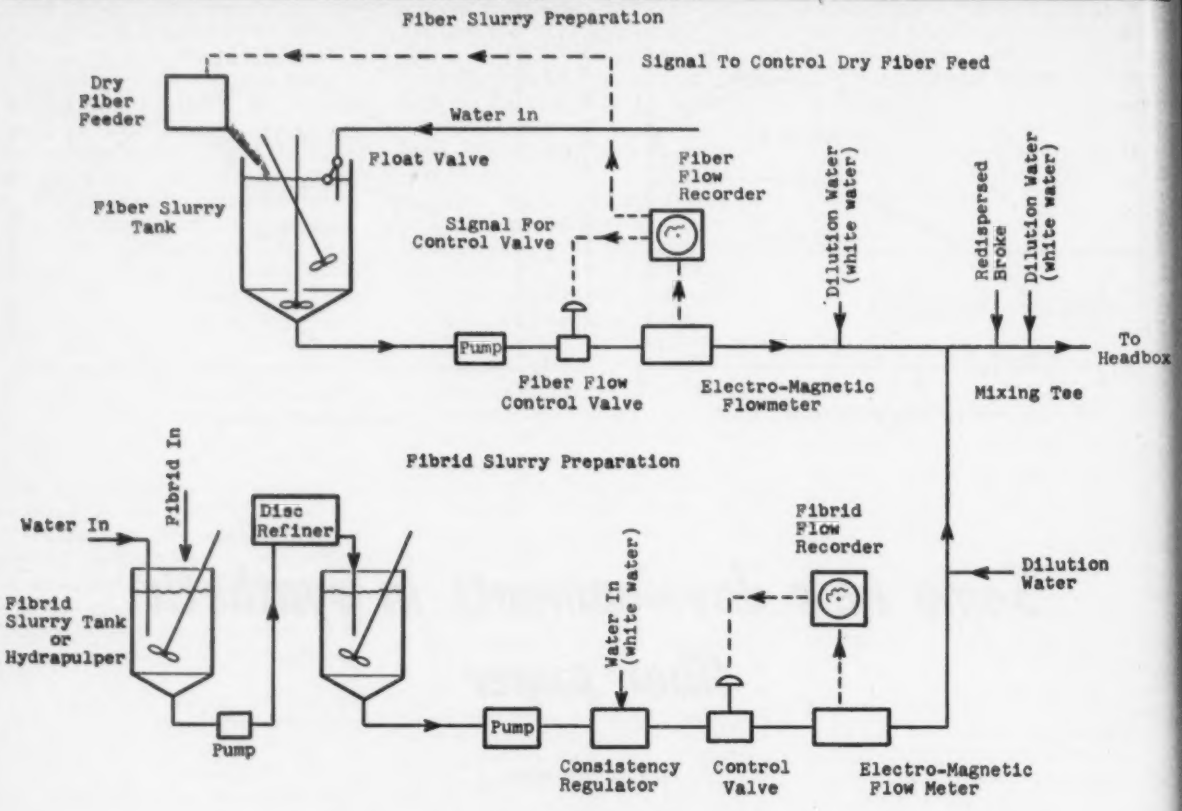


Figure 3 CONTINUOUS STOCK PREPARATION SYSTEM

Paper machine. At these low consistencies, an inclined wire headbox results in good sheet formation. Other wet-end arrangements such as the Roto-Former can also be used. Conventional arrangements for removing the waterleaf from the wire are satisfactory. In the wet press, Teflon-coated press rolls prevent picking of the sheet. Dryer cylinder speed must be adjusted to conform to the shrinkage pattern of the synthetic sheet.

Calendering. Calendering is carried out slightly above the fusing temperature of the fibrid, at about 400°F. for those fibrids which are currently available. Since the textryl must be raised uniformly to this temperature before it leaves the calender nip, preheating of the sheet is necessary to achieve commercial calendering speeds. At low textryl basis weights, a single calender nip is sufficient. At higher basis weights, two nips may be preferable. One calender roll is heated, the other is a resilient filled roll. The heated roll is coated with Teflon to prevent sticking of the textryl as it passes through the calender.

Felt Conditioning

(Continued from page 726)

Cleaning through conditioners

Many mills have instituted felt-washing programs using a detergent in conjunction with a conditioning device. This has met with considerable success, and both conditioners lend themselves to this application.

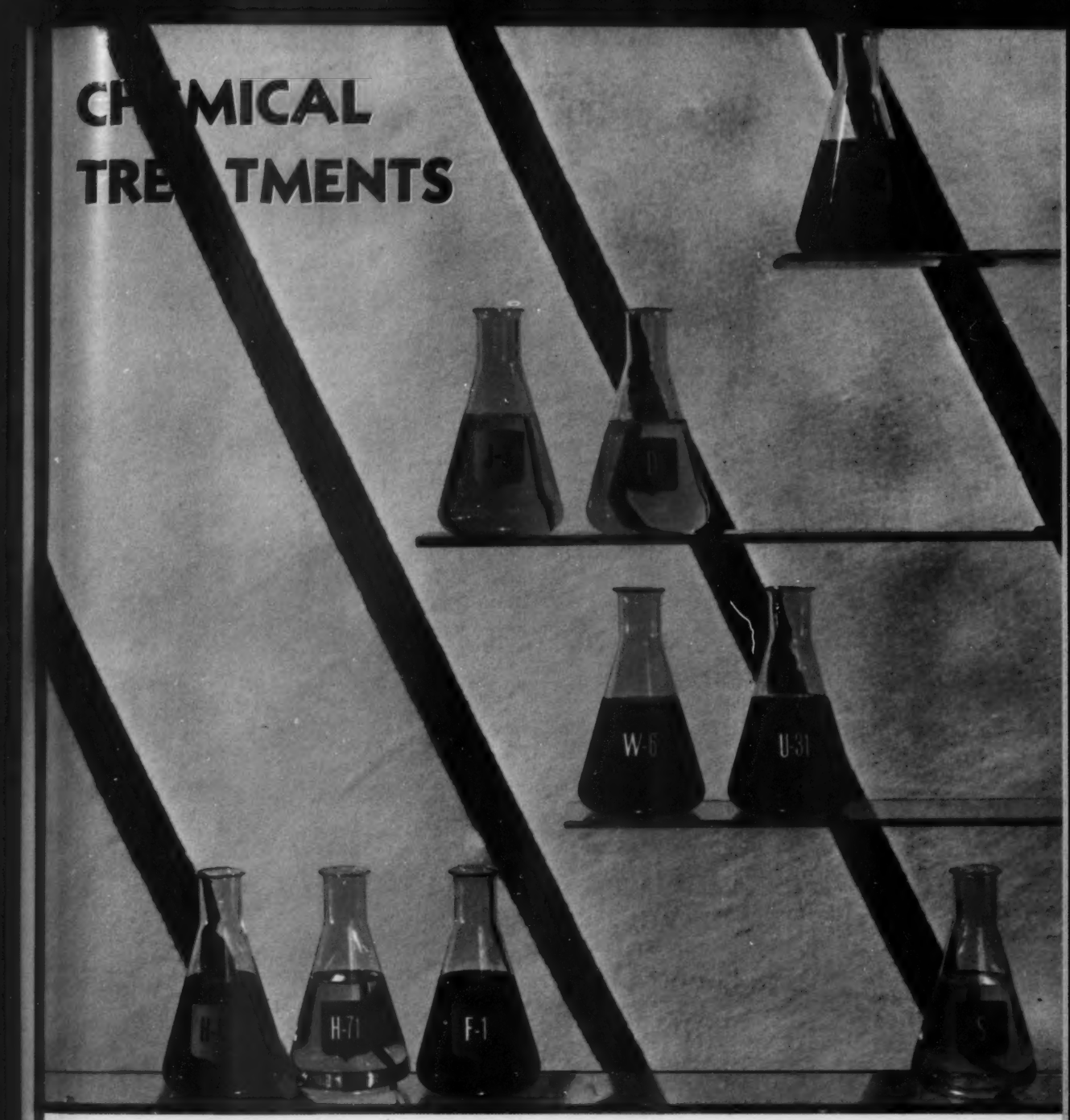
We believe cleaning with a conditioner must be done continuously. If the detergent is shut off for a period of time, the felt will undoubtedly begin to fill. Then if the detergent is reintroduced, there is a good chance that cleaning will occur in streaks which will be transmitted to the sheet.

It is our belief that the detergent should start running on the felt when the felt is new and should continue throughout the life of the felt. It is much easier to clean dirt from the surface of the felt than it is to clean the material after the dirt has become firmly embedded in the body of the fabric.

The amazing thing about continuous felt washing is the good job that can be done with extremely small amounts of detergent. Generally, from one to three pints of detergent are mixed in 50 gal. of water. It is advisable to wet out most nonionic detergents in a small quantity of water before adding it to the supply tank. This usually aids blending of the detergent.

The detergent solution is fed into the fresh-water line of the conditioner by a proportioning pump. This is done at such a rate that the 50-gal. mixture should last for approximately eight hours.

It may seem unbelievable that such a small amount of detergent should have a beneficial effect, but this technique has been tried and proven in a large number of mills, and there can be little doubt as to its efficiency.



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- — a stock inlet allowing direct top, bottom, front or rear infeeding which simplifies installation piping;
- — a tangential inlet which changes flow direction from linear to rotating, yet retains velocity head;
- — a special stator which provides uniform internal distribution of pulp;
- — a patented high-efficiency rotor which increases capacity without additional horsepower;*
- — a bottom accepted stock outlet permitting all sub-floor piping;
- — a full length quick-opening door for routine accepted stock sampling;
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These features are resulting in peak capacities and high discharge consistencies at lowest horsepowers. Reject richness is readily controlled. Engineered simplicity is characteristic of the entire line of Impco Centrifugal Screens which require very little operating attention and mechanical maintenance.

* U. S. Patent No. 2,845,848.

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LAYNE OFFERS COMPLETE WATER SERVICE: Initial Surveys • explorations • recommendations, site selection • foundation and soil-sampling • well drilling well casing and screen • pump design, manufacture and installation • construction of water systems • maintenance and service • chemical treatment of water wells water treatment—all backed by Layne Research. Layne services do not replace, but coordinate with the services of consulting, plant and city engineers.

LAYNE & BOWLER, INC., MEMPHIS

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LAYNE ASSOCIATE COMPANIES THROUGHOUT THE WORLD

SALES REPRESENTATIVES IN MAJOR CITIES

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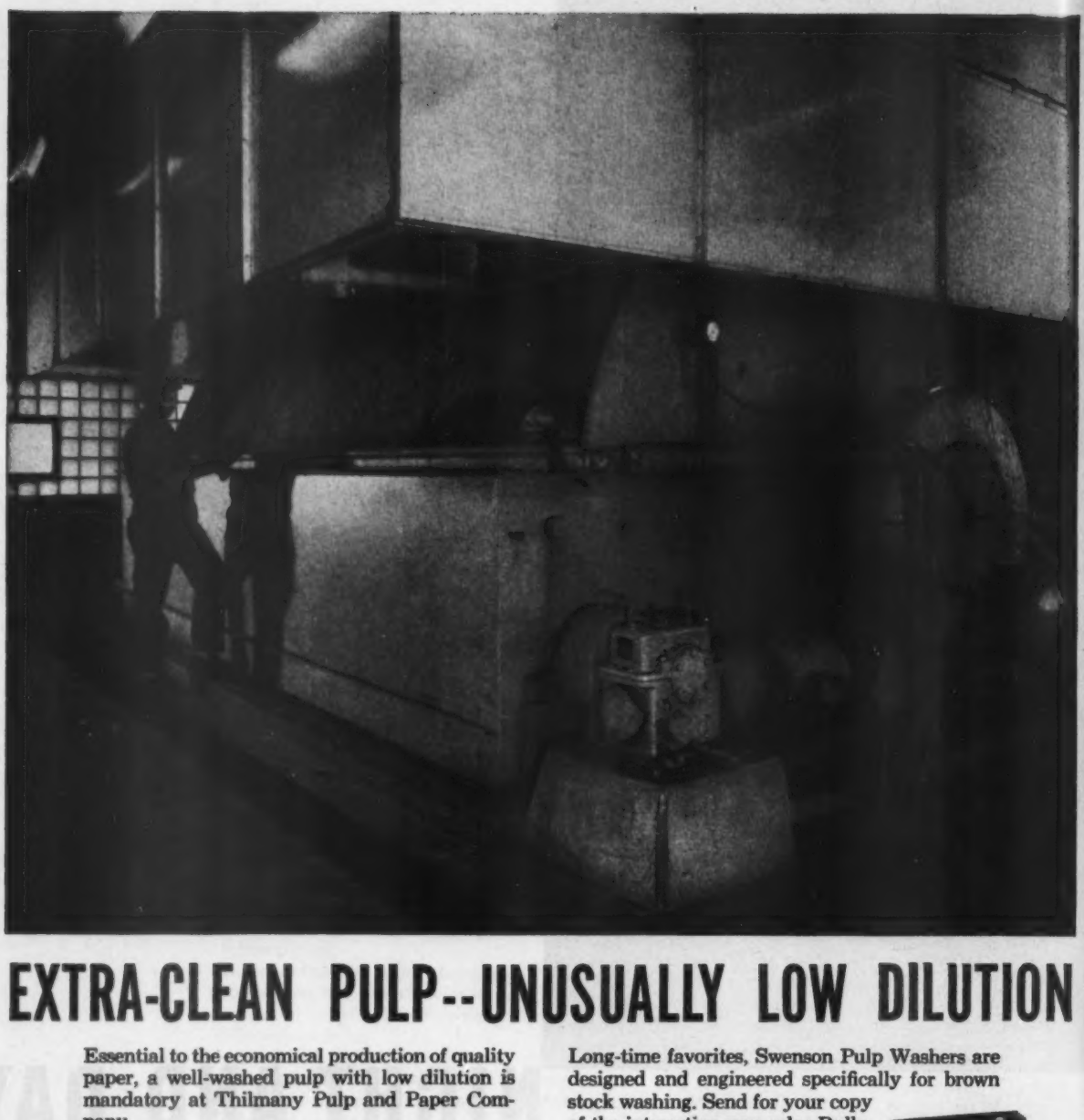

EXTRA-CLEAN PULP--UNUSUALLY LOW DILUTION

Essential to the economical production of quality paper, a well-washed pulp with low dilution is mandatory at Thilmany Pulp and Paper Company.

That's why the Kaukauna, Wisconsin papermaker relied on Swenson to provide the washers that furnish clean pulp at the lowest possible dilution. Now, with its line of Swenson 4-drum, 5-stage brown stock washers, Thilmany reports improved performance . . . *and* marked reductions in operating costs accompanied by an increase in quality of paper.

Long-time favorites, Swenson Pulp Washers are designed and engineered specifically for brown stock washing. Send for your copy of the interesting new color Bulletin 243, "Processing Profiles"—a tour of Swenson Processing Equipment in action at Thilmany and many other installations.

Swenson Evaporator Company, 15653 Lathrop Avenue, Harvey, Illinois.

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SWENSON

A Division of WHITING Corporation

WHITING-MANUFACTURERS OF CRANES, TRAMBEAM® HANDLING SYSTEMS, PRESSUREGRIP, TRACKMOBILES®, FOUNDRY, AND RAILROAD EQUIPMENT

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CURRENT COMMENTS

Squeeze is still on — Newsprint analysis — Figures on foreign trade

WARREN B. BULLOCK

The cost-price squeeze in paper manufacturing, shown by company reports of higher sales with lower net income, was again manifested in the first days of December with a general decrease in the prices of bleached sulfite and sulfate pulps.

The first price reductions were announced by the Weyerhaeuser Company with a reduction on kraft to $135 from the former $145 and a cut in price of bleached sulfite to $130 from the former $135. Other companies soon followed suit. The price reductions applied to sales of market pulp and would have an immediate effect principally on the paper mills which buy their raw stock.

Year-end special grants to stockholders were not as generous as a year ago but extra dividends, or stock dividends, or both, were reported by Hammermill, Sorg, St. Croix and American Writing, among others.

Despite repeated talks of depressed business conditions, various companies are continuing to go ahead with plans for improvement or expansion. Brunswick Pulp & Paper Co., owned by Scott Paper Co. and Mead Corp., has announced plans to double the capacity of its Georgia mill to 1,000 tons a day, at a cost of $35,000,000.

Kimberly-Clark, which has reported increased earnings and sales for the last five successive quarters, is exchanging 381,294 shares of common stock for the Ralph L. Smith Lumber Co. in California as the forerunner to plans for a kraft pulp and paper mill on the Sacramento River. At current prices for Kimberly-Clark stock the deal represents some $25,000,000 and gives the company 325,000 acres of excellent timberlands.

Foreign trade

Late official figures on the foreign trade of the United States paper industry place the industry's exports of pulp and paper at approximately $337 million annually, ranking the industry fifteenth in the nation's list of exporting industries. Imports totaled $1,089,400,000 or seventh in importance in order of the nation's imports. The 1960 surge is expected to put the export figure up to 500 million in 1960.

Newsprint survey

Dr. Louis T. Stevenson who retired some years ago from the economist's desk of the American Paper & Pulp Association under an age limit retirement program, is not only holding berth with a Wall Street house as its paper industry expert, but has prepared an exhaustive analysis of the market situation in the field of newsprint. This survey, undertaken for the American Newspaper Publishers Association follows his similar survey for the magazine publishers a couple of years ago. The newsprint survey says that current capacity of 10,000,000 tons of newsprint a year should be raised to 11,300,000 tons by 1965 and to 12,000,000 tons by 1970. Dr. Stevenson also says that newspapers should expect a 10 per cent reserve capacity to meet unexpected or abnormal requirements, and bases his figures on an estimated operating ratio of 90 per cent of rated capacity. His figures cover requirements of newspapers in the United States and Canada, with allowance of 1,240,000 tons for export.

While newsprint production in the United States has been going up, Castro is going into the red in his production of newsprint in Cuba. A report by the Newsprint Information Committee of the United States and Canada says that the island's only newsprint mill is running into the red at the rate of $140,000 a month at government expense. Newspapers are restricted to 16 pages on week days and 24 pages on Sundays. The loss is running to about $100 per ton. The Castro government took over the mill in 1959.

J. D. Zellerbach resigns

After nearly four years in Rome, as United States Ambassador to Italy, J. D. Zellerbach, San Francisco paper manufacturer, has resigned. His letter to President Eisenhower, dated before the recent election, stated that after so long an absence, his personal affairs have necessarily suffered from neglect.

Corporation changes

Gibson Greeting Cards Inc. of Cincinnati, Ohio, and *Nashua Corp.* of Nashua, N.H., has announced an agreement to form a joint enterprise to be known as *G N Papers Inc.* It will be equally owned by Gibson and Nashua and will acquire the assets of Nashua Corp.'s Pakay Division. Pakay is engaged in the manufacture and sale of party paper products, such as printed napkins, tablecovers, cups, plates, etc.

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Two long-established Canadian industrial firms have become independent operating divisions of a newly formed organization, *Midland-Ross of Canada Ltd.*, with headquarters in Montreal. They are Ross Engineering of Canada Ltd., which becomes Ross of Canada, Division of Midland-Ross of Canada and *Surface Industrial Furnaces Ltd.*, which becomes Surface Combustion, Division of Midland-Ross of Canada. The two divisions will remain under the same management as before.

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Allied Paper Corp.'s Business Forms Division has announced the acquisition of the *Connecticut Manifold Forms Co.* of West Hartford, Conn. This makes the sixth Business Forms Co. purchased by Allied since April.

• • •

Hercules Powder Co. of Wilmington, Del., and the *Varn Timber Co.* of Hoboken, Ga., have announced the

Bear Down on FOAM

with Dow Corning Silicone Defoamers*

There's a *right* tool for every job. In foam control it's Dow Corning silicone antifoamers or defoamers . . . job-proved thousands of times over as the most efficient, most economical, and most versatile foam suppressors available.

*At prescribed levels, are sanctioned by FDA

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Dept. 6713

Please rush a FREE SAMPLE of a Dow Corning silicone defoamer for my product or process, which is (indicate if food, aqueous, oil or other): _____

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

_____

For more data circle 116 on Post Card

Current Comments . . .

formation of the *Pine Gum Production Corp.* The new corporation will produce commerically pine gum and continue a research of the Pine Gum Production Corp. to produce, commercially, pine gum and continue a research and development program started early this year which attempted to increase the production of gum dip from the Southern pine.

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Hudson Pulp & Paper Corp. of New York, N.Y., has acquired all the outstanding stock of *Angel Soft Tissue Mills Inc.* in Thomson, N.Y. Plans are for continuation of all present Angel Soft operations under Angel Soft management as a separate company.

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Hammermill Paper Co. of Erie, Penn., and *Coast Envelope Co.* of Los Angeles, Calif., have announced that the holders of all of the common stock of Coast Envelope Co. have agreed to accept an offer by Hammermill Paper Co. to issue 122,838 common shares of its common stock in exchange for Coast Envelope common stock.

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Bemis Bro. Bag Co. of St. Louis, Mo., has acquired a substantial interest in the *Systemation Corp.*, a St. Louis-area firm which specializes in the development of integrated and automated packaging systems and machinery.

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North Carolina Pulp Co. and *Weyerhaeuser Southern Corp.* have been liquidated as subsidiaries of *Weyerhaeuser Co.*, Tacoma, Wash. North Carolina Pulp Co. of Plymouth, N.C., was acquired by Weyerhaeuser in 1957 as a result of the merger with Kieckhefer Container Co. and the Eddy Paper Corp. It will continue operations as the North Carolina division of Weyerhaeuser's pulp and paperboard group. Weyerhaeuser Southern Corp. was formed in 1959 following the purchases of Old Dominion Box Co.'s folding carton and shipping container plants at Charlotte, N.C. This plant will become a part of the Southern region of Weyerhaeuser's boxboard and folding carton division.

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Fisher Governor Co. of Marshalltown, Iowa, manufactureres of pneumatic and electronic automatic control equipment, have acquired the *E. Herbert Vickery Co.* of Oakland, Calif., manufacturers of a line of advanced design ball-type valves.

• • •

Plans to enter the plastic industry by acquiring *Worcester Moulded Plastics Co.* of Worcester, Mass., was announced by *Packaging Corp. of America* of Evanston, Ill. This move will enable Packaging Corp. to provide industry with a long-desired single source of supply and design talent for both packaging materials.

• • •

Scott Paper Co. of Chester, Pa., has announced that its wholly owned subsidiary, *Falls Paper & Power Co.*, has bought the assets and business of *Joa Co.*, Lake Wales, Fla. Joa has been making "Confidets", Scott's new sanitary napkins.

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United Board & Carton Corp. of New York, N.Y., has acquired the *Sandusky Folding Box Corp.* of Sandusky, Ohio. United will supply quantities of paperboard for the boxes manufactured by Sandusky.

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The *Louis Allis Co.* of Milwaukee, Wis., has announced the purchase of the *Dynapar Corp.* of Skokie, Ill., manufacturers of custom electronic equipment. Dynapar's product line can be marketed as a separate and distinct product line by Louis Allis or in conjunction with the Louis Allis adjustable speed drive equipment. This move will mark Louis Allis' entry into the field of electronic equipment.

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Black-Clawson Co. of New York has acquired the plastic extruder business of the *Aetna-Standard Division of Blaw-Knox Co.*, Pittsburgh, Penn.

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Boards of Directors of *Champion Paper & Fibre Co.* and *Carpenter Paper Co.* have jointly announced that they have agreed to recommend to shareholders that the two companies be joined on a basis which will give 1,825 shares of Champion common stock held. Each company will continue to do business under its own name with present management and in their present locations. Carpenter is headquartered in Omaha, Nebraska, and is a distributor of printing, writing, commercial and industrial papers. Champion is headquartered in Hamilton, Ohio, and is a producer of paper and paperboard.

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National Starch and Chemical Corp., New York, has joined forces with Jordan Chemical Works (A'sia) Pty. Ltd., Sydney, Australia. The new company, Jordan — National, will manufacture and sell vinyl polymers

(Continued on page 760)

NEWS of the INDUSTRY

Packaging Institute Welcomed as New Associate In European Packaging Federation

An event of unusual international packaging interest took place in New York recently when the Packaging Institute, the American National Packaging Association, was welcomed as a new associate overseas member in the European Packaging Federation.

In accepting this welcome, L. H. Zahn (of Ciba Pharmaceutical Products and newly elected Institute president) expressed the hope that "the alliance of these widely separated packaging groups will bring about a better exchange of packaging knowledge and foster developments in packaging techniques of great value to the nations on both sides of the Atlantic".

Uses for Pulp Chemicals Are Expanding Sharply

From practically nothing to a current annual rate of 150 million lbs.—this has been the 15-year growth of the production of tall oil fatty acids, a whole new class of pulp chemicals derived from a paper industry by-product.

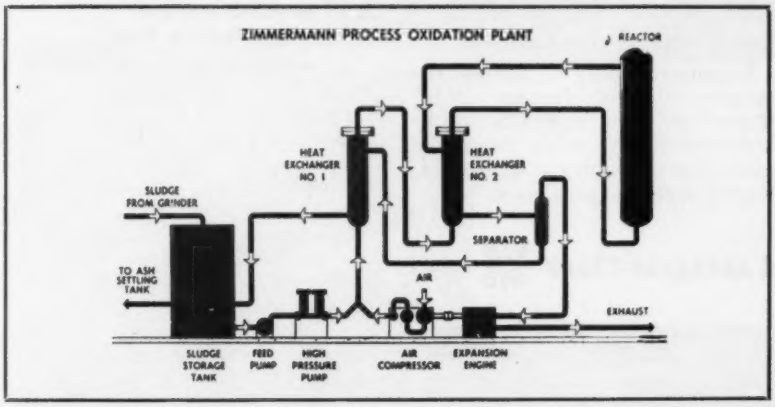
The above statement was made during a panel discussion which represented the Pulp Chemicals Association during the recent meeting of the Northeast Section of the American Oil Chemists' Society. This panel spotlighted various markets now consuming the vast amount of tall oil fatty acids produced in the U.S.

The first major market for the consumption of these materials is the paint, varnish, lacquer and coating field. Tall oil fatty acids are being used increasingly in this field because of the combination of low cost and superior paint properties imparted for various household appliances finishes. Another growing market for tall oil fatty acids is in the soap, emulsifier and synthetic detergent field. The panel indicated that there will also be greater domestic increase in the use of these new pulp chemicals for such applications as low temperature rubbers, plasticers for vinyl products and synthetic detergents.

One speaker stated that this industry will have no major immediate competition from either the Free World or Satellite Nations. European production of crude tall oil fatty acids is less than 20 per cent of the U.S. production. Conversely in the international scene, the U.S. export picture of these products seems to be expanding in the near future for the requirement of special tall oil fatty acids in Europe and other export areas.

Despite the overall satisfactory picture of tall oil products in the markets of the 60's, a cautionary note was introduced by another speaker who indicated that the pulp and paper indus-

New Method of Sewage Sludge Disposal



An entirely new process for ultimate destruction of sewage sludges has been launched commercially.

This new process is called the Zimmerman Process (also known as the wet oxidation process). It was invented by and named after F. J. Zimmermann of Sterling Drug Inc. The A. O. Smith Corp., a producer of pressure vessels, cooperating with Sterling Drug Inc., designed the highly specialized, Multi-Layer reactors, heat exchangers and other critical hardware that make the process tick. Results of the joint effort were publicly shown for the first time at the Water Polution Control Federation Convention held in October in Philadelphia.

During the operation of this process, which works along the lines of a pressure cooker, a concentration of sewage sludge is pumped into a stainless vessel under pressure. At from 400° to 700°F., the wastes are burned. The heat generated helps sustain the reaction, and any excess can be used to generate electricity. The end products are a water-born inert ash, completely inoffensive and suitable for fill, and the ordinary gaseous products of combustion (i.e. inoffensive carbon dioxide and nitrogen.)

With growing acceptance in small-to-large sewage sludge disposal plants, the Zimmermann Process has secured strong footholds in industry. Its ability to destroy the waste products of pulp and paper mills, for example, has aroused the interest of Hammermill Paper Co., in Erie, Penn. Here, a 40-ton-a-day unit has already been installed. Another mill installation is scheduled for completion this year by Norway's largest pulp and paper manufacturer. This will be a 500-ton-a-day unit.

Two other large installations now under construction are; a new sewage plant in Wheeling, W. Va., which is scheduled for completion by the middle of 1961, will incorporate a Zimmerman unit to destroy 5.6 tons of sewage sludge a day; and The Metropolitan Sanitary District of Chicago, Ill., which is currently engaged in a massive program, will install four 50-ton Zimmermann units at its West-Southwest Treatment Works. This will be a 200-ton-per-day system.

try could not meet for many years to come, the total demand that has existed for gum and wood rosin. Traditional naval stores products have been used increasingly for the past 50 years in many of these industries. The speaker noted that the pulp and paper industry is contributing greatly to the overall production of rosin, but it would appear that the revival of the gum naval stores industry will be essential to provide the major source of rosin in the future.

New Trademark for Langston

Beginning January 1, Samuel M. Langston Co. of Camden, N.J., adopted this new trademark which symbolizes the role of the company's machines in corrugating or slitting and winding paper and paperboard.

The new trademark and logotype will appear on all Langston machines, packaging, sales material, bulletins, advertising and business forms.

Scholarship Fund

Three associations in which the late Wayne Brown had been an officer, the Kraft, Sulphite and Tissue Associations, have raised a Wayne Brown scholarship fund of $5,000 to assist needy male students to acquire an education at Ursinus College. Mr. Brown was an alumnus of Ursinus and during his undergraduate years was a star half back on the college football team, a member of the basketball team and a leader in campus activities.

Round Table at Albany

Albany Felt Co. of Albany, N.Y., was recently host to the gathering of 24 tissue mill managers and superintendents who attended a round table conference held at Albany's main plant.

Pickup felt design and the Walhstrom theory of water removal were major topics for the conference which covered subjects of interest submitted in advance by paper mill men. Future meetings of this type are now being planned.

New Packaging Group

A new trade group to be known as the Bulk Packaging & Containerization Institute has been formed.

This new organization will deal primarily with new concepts in shipping containers and practices. The association expects to serve users as well as manufacturers of many types of bulk containers, which are relatively new and not now covered by existing associations. It will serve as a clearing house for information on all such containers and will aid in establishing acceptance specifications.

Officers will be elected and preliminary plans will be discussed at an open meeting on January 19 in the Sky Top Room of the Statler-Hilton Hotel, New York.

Joint Huyck-Kenwood Marketing Meeting Held

A joint marketing meeting of the Huyck Felt Co., Rensselaer, N.Y., and Kenwood Mills Ltd., Arnprior, Ontario, Canada, was recently held for the purpose to exchange information on improved felt application techniques and customer service. New developments in design, treatments and field service instrumentation were also thoroughly explained and their benefits described.

A highlight of the meeting was the discussion of the progress made with needled felts. Porosoft felts were reported as having been run on all types of paper machine operations with very encouraging results. Their properties of improved finish, good drainage and added toughness have been enthusiastically received in the field. Porosoft felts were reported as standard designs on many machines where much improved performance and production are common.

Forestry Notes

The Society of American Foresters held its sixtieth anniversary meeting in Washington, D.C. from November 13 to 16. George Amidon of the Minnesota & Ontario Paper Co., International Falls, Minn., told the group that the United States pulp and paper industry has expanded 579 per cent in use of pulpwood during the past 40 years. He said that in 1920, consumption of pulpwood totalled 6,114,000 cords, and that in 1960 the consumption is an estimated 41,500,000 cords. He indicated that the industry will continue to grow at about the same rate as in the past 10 years and that consumption of pulpwood will increase from about 41 million cords this year to about 59 million cords in 1970.

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Two medals for outstanding service to forestry were awarded at the final session of the sixtieth Anniversary meeting of the Society of American Foresters. Clyde Martin, now a retired former chief forester for the Weyerhaeuser Co. received the Sir William Schlich memorial medal. The Gifford Pinchot medal went to Earle H. Clapp of Washington, D.C. Clapp has served his entire professional career in the Forest Service of the U.S. Department of Agriculture.

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A special committee to assist the nation's club women in conservation activities has been appointed by the forest products industries. John H. Hinman, of this group, said the creation of this committee is justified by the growing interest of women in conservation and wise use of the timber resource. The committee is composed of wives of forest industry leaders and is headed by Mrs. Everett G. Griggs II of Orting, Wash., Mrs. Griggs' own Tomolla Tree Farm is said to be a showplace of sound forest management.

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Believing that mill employees should be informed of the woods department's activities, T. S. Jones, mill manager at Dryden Paper Co., made arrangements with R.S.M. Bunney, the chief forester of the company, to issue a monthly Forestry News Bulletin. This bulletin is now prepared by the forestry department each month and is posted on all bulletin boards throughout the mill. The bulletin gives a month-to-month report on activities of the forestry department.

Recent Expansions in the Industry

Champion Plans Waste Treatment Plant

A $431,700 industrial waste disposal treatment plant will be built by Champion Paper & Fibre Co. at Hamilton, Ohio.

Preliminary plans were prepared by the Stream Improvement & Engineering departments of Champion, after extensive mill waste surveys and laboratory studies. Work is scheduled to begin at once. The plant will be constructed on Champion property across from the City's sewage treatment plant. Construction calls for a waste pumping station with a capacity to handle 24 million gallons of waste per day; a 105-ft.-diameter by 12-ft.-deep clarifier and thickener; a sewer to discharge the treated water; and a plant office and control laboratory.

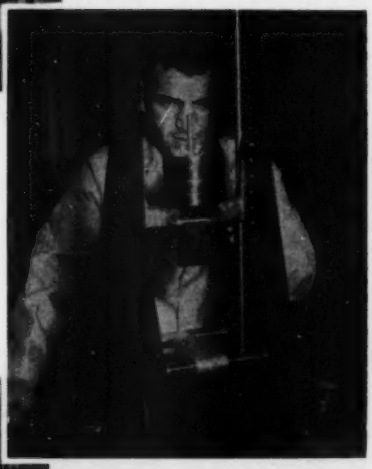
U.S. Testing Co. Offers Complete Service to The Paper Industry

Complete service to paper manufacturers and converters in testing, research and development is now being offered by the independent paper and paper products laboratory at the United States Testing Co. located in Hoboken, N.J.

The entire laboratory is precisely controlled for humidity and temperature as specified by TAPPI. A broad range of equipment enables the laboratory to test for expansivity, burst, impact, folding endurance, tensile strength, smoothness, porosity, and many other characteristics. All testing machines are calibrated every 30 days,

Mullen burst test made on corrugated board.

McLaurin stick test for gummed tape.



Measuring impact resistance of reinforced tape.

Shown here is the impact test of barrier packaging material in paper testing laboratories at the United States Testing Co.

Shown here is a test of barrier paper for water resistance, impact resistance and heat sealing properties. Also under test are gummed paper (sealability) and map paper (dimensional) stability.

and some equipment every time it is used.

In addition to doing research, development and testing on paper, intensive programs are also being carried on the wire, adhesives, inks, cover materials and coatings.

The new laboratory will serve the converter as a quality control agency for income raw materials, enabling them to save considerable processing costs and customer good will. Evaluation engineers are able to induce failure in the laboratory and prevent trouble in the field.

For the paper manufacturer, the laboratory acts as a control on his own laboratory. Physical and chemical tests can also be run for the manufacturer

Testing softness of tissue in paper.

as overflow assignments. Paper specialists at the laboratory are also available to serve in a consulting capacity for mill operations studies.

Typical paper products tested regularly by the U.S. Testing Co. are: adding machine tapes; barrier material wrapping; binding; binding board; bond paper; book paper; cardboard; carrier carton; cartons; tapes; check writing paper; envelopes; facial tissues; filter paper; kraft paper; labels; multi-wall bags; paper towels; playing cards; wax paper; stationery; tea bag paper; toilet tissue; wallpaper; and wrapping tissue.

J. E. Sirrine Gets Contract for Georgia Mill

The award of a million-dollar engineering contract for planning Southern Land, Timber & Pulp Corp.'s new $42,000,000 plup and paper mill has been given to the J. E. Sirrine Co. of Greenville, S.C. The contract involves engineering assistance to Southern's own engineering staff in the preparation of plans and specification for mill construction.

Southern's new mill will be located in Cedar Springs, Ga. — 16 miles southwest of Blakely, Ga. It will be a 600-ton-per-day kraft linerboard unit. The paper machine will be a Beloit design and manufactured with a 280-in. wire width, 152 ft. long. Also in the plans are a 667-ton-per-day recovery unit and six body sextuple effect evaporators. The mill will include a waste disposal system complete with solids removal and oxidation facilities.

Present plans call for completion of this unit by late 1962 and probably installation of a newsprint machine during 1963.

Indian Paper Co. Ready to Start Construction

The financing and construction plans are now complete for the first pulp and paper mill to be built in Madras State, India. This mill will be an integrated plant producing 60 long tons per day of printing and writing papers from bamboo and sugar cane bagasse pulps. Cost of the mill will be $12 million and will be built by Seshasayee Paper & Boards Ltd.

A loan authorized by the Export-Import Bank of Washington has been obtained. The balance of the financing was obtained through a loan from the Industrial Credit & Investment Corp. of India in Bombay and through subscriptions of share capital by Seshasayee Brothers (private) Ltd. and other private interests in India and North America.

Backed by the facilities of the Parsons & Whittemore-Lyddon Pulp & Paper Mill Project Division, the Parsons & Whittemore South Asia Co. is directing overall planning, engineering, equipment supply, erection and start-up of the mill. Construction will begin immediately. Orders have been placed for the principal equipment, which will be built in the United States by four divisions of the Black-Clawson Co.

Jamesbury Plans Expansion

An announcement from the Jamesbury Corp. of Worcester, Mass., states that the company will construct a new plant in Worcester, Mass. The new location was developed by the City of Worcester to encourage the company's expansion in it's own home town. Construction is scheduled to begin in the Spring of 1961.

Orr Felt Adds New Equipment

Orr Felt & Blanket Co. of Piqua, Ohio, has announced that the company engineers are preparing to install approximately $400,000 worth of new felt manufacturing equipment.

The very latest and most modern needling machines, as well as drying and other equipment are included in the program.

M. B. Orr, president of Orr Felt, announced that the company is discontinuing the manufacture of bed blankets and apparel fabrics in order to provide the room necessary for the new machinery for the felt operations.

Olin Mathieson Will Construct Caustic Soda Plant

Olin Mathieson Chemical Corp. of New York will construct a chlorine and caustic soda plant at Charleston, Tenn. The new facility represents another step in the corporation's internal expansion program, and will allow Olin Mathieson to add to its ability to supply southern markets. The chemical's division of the corporation is now a major supplier of chemicals to southern pulp and paper industries.

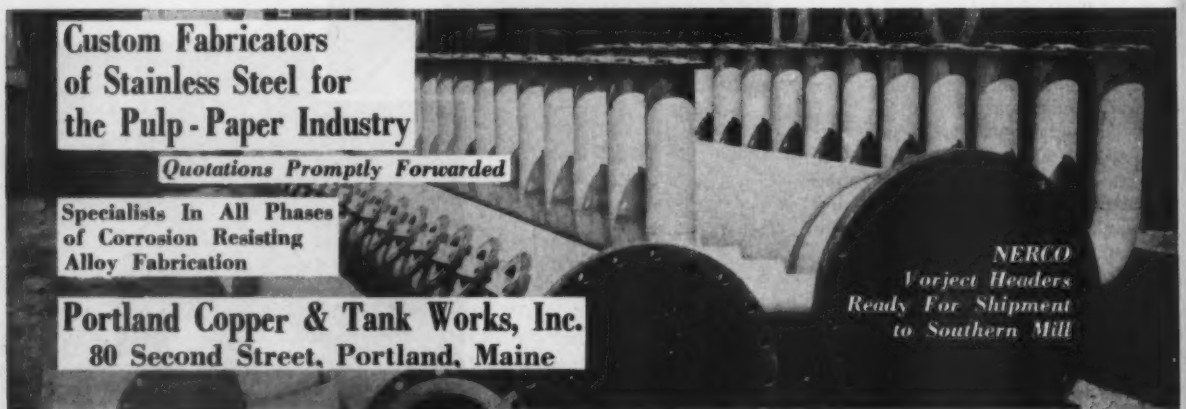
Lily-Tulip Opens Technical Center

A new Technical Center, to be used for the continuous research and development of new materials, machine designs and production equipment and for the analysis of potentially useful products has been opened by Lily-Tulip Cup Corp. of New York.

Planned as an integral part of Lily-Tulip's continuing expansion program, the Center is located in Commack, L.I., and will concentrate all of the company's research and development functions under one roof. Prior to the new facilities, the company's research and development functions were divided between Chicago and the company's College Point plant.

The Center is being co-managed by Stephen W. Amberg, director of research and development, and Rufus S. Hovey, director of manufacturing engineering. They will supervise a staff of 150 employees.

(Continued on page 740)



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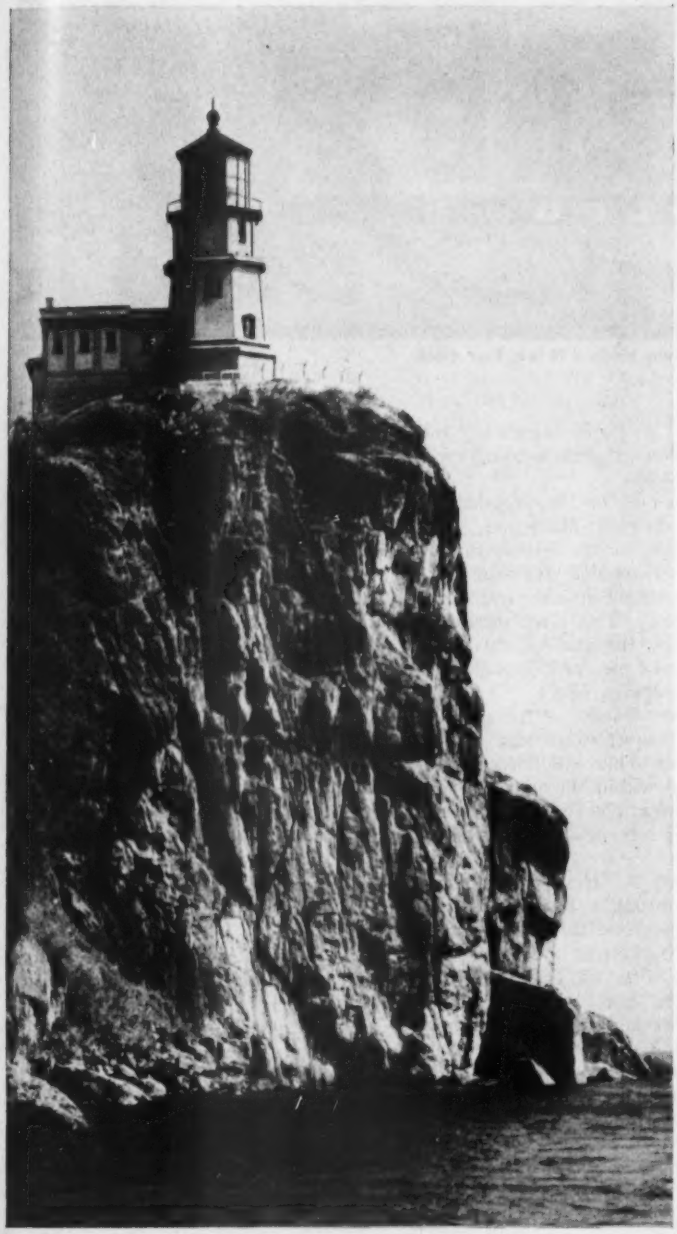
*Idea submitted by William A. Steadwell, St. Regis Paper Co., Jacksonville, Florida

Photo by: Louis C. Williams, Nashville, Tenn.



HAM FELTZ says:

"Reminds me of HAMILTON Felts... always reliable!"

"Navigators on Lake Superior
look to Eagle Rock Light House
for the same reason many papermakers
look to Hamilton Felts . . .
reliability.

"The reliability that characterizes
Hamilton Felts is the result of
our traditional code of proud craftsmanship,
and our continuing program
of technical improvement.

"So if *you* want felts
on which you can rely for
consistent, high quality performance,
and economical long life,
look to Hamilton Felts.

"If one of our 300 modern,
technically proved patterns
won't solve *your* specific problem,
we'll be happy to design
a Hamilton Felt that will.
Just ask your Hamilton Felts Service Salesman."

*WIN . . . *A NEW Shakespeare Spincast Fishing Outfit!*

"What famous place reminds you of Hamilton Felts? Tell us why in a few words; sign your name and address and name of company . . . Each idea from a U.S. papermaker that we use wins a new 1961 model Shakespeare Spincast Rod and Reel—FREE! When identical winning ideas are submitted by 2 or more papermakers, the one with the earliest postmark will be considered the winner. Every U.S. papermaker *entrant* receives a famous Rex Spoon fishing lure — FREE. Send me your suggestion — today. Ham Feltz, 612 First National Bank Bldg., Cincinnati 2, Ohio."

YOU CAN'T BEAT

Hamilton

FELTS

SHULER & BENNINGHOFEN, HAMILTON, OHIO

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For more data circle 119 on Post Card

News of the Industry . . .

(Continued from page 738)

Texas Gulf to Build $25-Million Plant

Construction will begin immediately on a new $25-million potash mining and processing plant in southeastern Utah for the Texas Gulf Sulphur Co. of Los Angeles, Calif.

The company disclosed that a core drilling program in the Can Creek, Utah, area had confirmed a very large potash deposit "believed to be richer than any known to exist in the United States". The board of directors, in a recent meeting, authorized the exercise of an option to acquire reserves in that area.

The new plant will be designed to produce annually up to "well over a million tons of muriate of potash", the form in which the bulk of all potash is sold.

Bemis Expands and Modernizes

Bemis Bro. Bag Co. of St. Louis, Mo., has announced that the company will begin a plant expansion and modernization program totaling more than $1,200,000.

Main features of the program include the following: *Muskegon, Mich.* —a new plant for the manufacture of Tekmold (a molded cellulose produced in a variety of protective forms for packaging). This plant should be completed by the end of this year. The company's present Tekmold plant is in Minneapolis, Minn.

Vancouver, Wash. — An addition of a 32,000-sq.-ft. warehouse adjoining its plant. This will release warehouse space within the plant for expanded production, and the company plans to install new multiwall bag equipment.

Claremont, N. H. — This paper mill will install a $250,000 beater which will increase the plant capacity by about 10 per cent.

St. Louis, Mo. — This is the Bemis Visinet mill which produces woven paper and textile, open-mesh material. It is completing a $165,000 program which adds 13,500 sq. ft. of integrated floor space and new finishing facilities.

Flemington, N. J. — A 10,000-sq.-ft. plant addition will be made and $125,000 will be added in production equipment.

Link-Belt Co. Establishes International Division

Link-Belt Co. has established an International Division with headquarters in the company's executive offices in Chicago. Donald E. Thal has been appointed general manager of the new division and will administer the company's overseas activities outside the U.S. and Canada.

The operations include Link-Belt Africa Ltd. of Springs, Union of S. Africa and Link-Belt Engenharia, Industria e Comercio Limitada, Sao Paulo, Brazil. In Australia, there is an affiliated company, Link-Belt Pty. Ltd. of Marrickville, New South Wales.

To serve Europe and the Mediterranean countries, Link-Belt Co. has organized a new subsidiary, Link-Belt S.A., located in Geneva, Switzerland. This company will administer to licencees in Italy, France, Great Britain and Belgium, and also provide service to Link-Belt foreign sales representatives in this area.

(Continued on page 760)

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NAMES in the NEWS

R. T. Vanderbilt Co.

Ray E. Harter has become manager of the paper department of R. T. Vanderbilt Co. Inc. He has been with the company for 26 years and for the past ten years he has been assistant manager. Prior to this he was employed by the A. E. Staley Co. and old Kalbfleisch Corp. Harter is well-known throughout the United States and Canada.

William L. Craig is coordinator for the paper dept. of the R. T. Vanderbilt Co., Inc., New York, N.Y. This is a new position created for closer work between the New York office and the paper laboratories. He will continue to make his headquarters at East Norwalk, Conn.

Richard M. Talbott is assistant manager of the paper dept. For the past six years he has been New England and Eastern New York State sales representative.

Owens-Illinois

C. E. Reed has been appointed general manager of the Chicago plant of the Paper Products Div. of Owens-Illinois Glass Co., Toledo, O. Reed has served in various managerial capacities with the company since 1934.

Leonard T. Moore, who has been serving as Chicago general manager as well as the division's North Central regional sales manager, will now devote his full time to the latter post.

Peter M. Coy, production manager at the Jacksonville corrugated box plant of the Paper Products Div. has been promoted to assistant general manager of the plant.

Clare F. Silkwood, who has been on special assignments at the plant for the past year, will succeed Coy as production manager.

St. Joseph Co.

Robert S. Cole has been appointed general manager of the St. Joseph Co. plant, Sharonville, O. Cole, a veteran of 33 years in the corrugated shipping container industry, was general manager of the Corning Fibre Box Co., Corning, N.Y., and was general manager of U.S. Corrugated Fibre Box Co. prior to joining St. Joe Paper Co.

G. H. Chidester chosen to receive 1961 TAPPI Medal

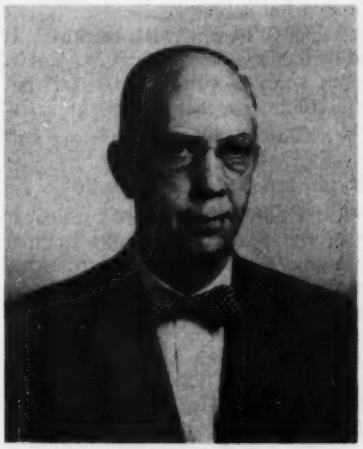
G. H. Chidester, chief of the U.S. Division of Pulp and Paper, U.S. Forest Products Laboratory in Madison, Wis., has been unanimously selected as the recipient of the 1961 TAPPI Medal by the executive committee of TAPPI.

After graduating from the University of Michigan in 1920, Chidester joined the technical staff of Kimberly-Clark Co. in Neenah, Wis. Three and a half years later he accepted a position on the editorial staff of The PAPER INDUSTRY where his duties required extensive travel through eastern U.S. and Canada for the development of technical material, editorial reports and articles. He was also a member of the technical staff of the Forest Products Laboratory.

Chidester and John D. Rue started the second semi-chemical mill operation at the Carolina Fibre Co. in Hartsville, S.C. This was the first operation of its type using semi-chemical pulp for a special grade of wrapping paper.

Various investigations were successfully conducted by him on problems concerning such processing procedures as the rod mill for paper stock preparation; hardwood newsprint; high-yield, bleached semi-chemical pulps; and sulfite and acid semi-chemical processes.

Chidester's work on the utilization of wood and numerous other exhaustive research projects of an original nature have contributed significantly to the progress of the industry. A man of international stature in this field, he is also in large part responsible for the development of men who have served under him — a number of whom now hold increasingly responsible technical positions in major pulp and paper companies. He is the joint holder of two patents, and during the course of his career has had 57 papers published. He is a member of TAPPI and the Wisconsin Academy of Science.



G. H. Chidester

Chase Bag Co.

Henry C. Toney has been promoted to project engineer at the Toledo, Ohio, plant of the Chase Bag Co. Prior to his promotion, Toney was assistant superintendent. Toney has been with the company since 1948.

Chicago Bridge & Iron Co.

George S. Trees has been elected a vice president of this steel plate fabricating and construction firm. Trees was named a regional sales manager earlier this year and has been with the company since 1939.

William M. Freeman has been appointed sales manager of Chicago Bridge & Iron Co.'s New York district. Freeman assumes his new position after two years as manager of the process equipment sales group.

Bemis Bro. Bag Co.

J. E. Zeller has been appointed resident manager of the Tekmold plant of Bemis Bro. Bag Co., to be opened at Muskegon, Mich. Zeller has been serving as a project engineer at the company's department of physical research in Minneapolis, Minn.

Gordon M. Robb, manager of the company's plant and sales division in

Names in the News . . .

Houston, Texas, has been transferred to the company's Peoria, Ill. plant and paper mill. Robb has been with Bemis 43 years.

Louis W. Chenault, former sales manager for the Houston division of Bemis Bros. Bag Co., has become manager of the company's plant and sales division. Chenault will replace Gordon M. Robb.

Daniel R. Porter Jr. has been named sales service manager of St. Louis paper specialty plant. Porter will be responsible for coordination of sales for paper specialty products.

Champion Paper & Fibre Co.

Reuben B. Robertson has resigned from the board of directors of the company, while at the same time he was re-appointed as a director emeritus and honorary chairman of the board. Robertson has been with the Hamilton, Ohio company since 1907.

Dr. Logan T. Robertson has taken over his father's position on the board of directors of Champion Paper & Fibre Co.

Tennessee Corp.

J. T. Parkerson, Jr., has been promoted to the position of assistant general manager at the East Point plant of Tennessee Corp., Atlanta, Ga. Parkerson was a sales and technical service specialist on liquid sulfur dioxide prior to this promotion.

D. J. Benjamin

W. J. Zellerbach

Crown Zellerbach Corp.

D. J. Benjamin, vice president for packaging has been elected to the board of directors of the corporation. Benjamin, former president of Waxide Paper Co., has been a vice president since 1957.

W. J. Zellerbach, vice president for marketing services, has also been elected to the board of directors. Zellerbach became director of marketing services in 1955, was appointed assistant vice president in 1957, and two years later was elected a vice president of the company.

Thomas I. Meehan, resident manager of the corporation's Carthage paper mill, has been appointed assistant manager of the company's pulp and paper mill division in Bogalusa, La.

James B. Palmer Jr., assistant mill manager since June, has been elected to succeed Meehan as resident manager in Carthage.

Dow Chemical Co.

Theodore G. Moore, chemical account manager in the Minneapolis sales office of the company, has been named to the merchandising section of the chemicals sales department at Midland, Mich. His knowledge of the pulp and paper industry will be utilized on his new job, a primary emphasis of which will be on merchandising products widely used in the industry.

Charles W. Cairns is plastics district sales manager in the Detroit office. Cairns has been a product manager in Midland responsible for coating sales to the paper industry and succeeds John E. Donalds who recently was named manager of coatings sales.

St. Regis Paper Co.

Thomas A. Hewson was elected assistant vice president — technology, and will be responsible for the administrative control of Central Research and Development, Technical Services and Control, Technical Planning and Packaging and Converting Equipment Engineering.

Ross P. Fallon was appointed production manager of the Cornell Paperboard Products Co. Div. paperboard mill at Milwaukee, Wis. Fallon has been manufacturing superintendent at the mill in Herrings, N.Y.

Leon G. Beekman has been appointed manager of manufacturing at the East Providence, R.I. plant of the Engineering & Machine Div. Beekman had formerly been chief staff industrial engineer on the staff of Willard E. Hahn, New York.

Dr. Otto Kallmes has joined the company's research and development dept. as a research chemist. Kallmes will carry on basic studies of the fiber networks in paper.

Roswell P. Fallon, of St. Regis Paper Co., New York, N.Y., was manufacturing superintendent of the company's Herrings mill. He has been promoted to production manager of the company's Cornell Paperboard Products Co. Div., paperboard mill in Milwaukee, Wis. Winslow B. Mills, also resident manager at the West Carthage mill, will replace him at Herrings.

Alfred E. Beecher has joined the research and development department of the company as a research engineer. He will be located in the engineering physics laboratories at East Providence, R.I.

Obie C. Burt, Jr., has joined the coating development group at Carthage, N.Y. Burt had been a chemist with the Lily Tulip Cup Corp.

Robert M. Benjamin has joined the pulping development group at Deferiet, N.Y. He had previously been associated with Bathurst Power & Paper Co.

Edward R. Hoffman has been named supervisor of statistical service at Carthage, N.Y. He had been chief statistician with Oxford Paper Co., Rumford, Me.

Maynard C. Nieboer has joined the coating research group at Carthage, N.Y. He had been a research chemist with Mead Corp., Chillicothe, O.

Marathon

John E. Goode, production manager and manager of the Green Bay plant, has been named assistant manager of the Northern Division. Goode served as a production executive in several positions before being named plant manager in 1955.

Larry S. Sabatke, manager of the Menominee, Mich. plant, will replace Goode as production manager of the Green Bay plant. He served as assistant superintendent and general superintendent of the Rothschild paper mill and most recently as plant manager at Ashland, Wis., and Menominee, Mich.

James E. Tippet, who has been the plant's assistant manager at Green Bay, will succeed Goode as manager.

Martti Lundstrom, formerly plant engineer, is the new manager of the Menominee plant.

Lamb-Grays Harbor Co.

Norman F. Richards has joined the company's sales engineering staff. He will be responsible for servicing Lamb customers on the West Coast and Canada.

Bowaters Engineering and Development Inc.

Karl O. Elderkin has retired as president of Bowaters Engineering and Development Inc., Calhoun, Tenn. Elderkin, who has spent almost four decades in the pulp and paper industry, was with Bowaters for eight years,

(Continued on page 758)

FOREIGN ABSTRACTS

Influence of beater additives on rosin retention

In two German paper mills, the authors made four separate studies dealing with effects of certain accessory compounds on the retention of rosin size (high in free resin acids) on the papermachine wire. Circulating water samples were taken for analysis at the head box, the flat screen, at points going to and from the saveall, etc. The finished papers were also analyzed. The accessory materials were titanium oxide and starch. If both of these were present in the furnish, and the white water was slightly alkaline, the rosin retention on the wire was only about 43 per cent of that introduced into the beater. When the white water was slightly acid, and when the only filler was kaolin, and the size contained 78 per cent free resin acids, the retention on the wire was over 76 per cent of that added initially. In two cases in which titanium oxide was present, the starch retention on the wire was only about 30 per cent.

In analyzing the final sheet, the amount of rosin and/or starch was computed on the basis of the amount retained on the wire. On this basis the highest yield was 93.3 per cent rosin and 88 per cent starch. This was obtained when the stock had a low percentage filler and no titanium oxide content, and when the mill was using a nearly closed circulating water system. The lowest yield of rosin in the paper was 73 per cent, and in this case the sheet retained only 58.5 per cent of the starch held by the wire; in this instance titanium oxide was present, and there was open water circulation, with a pH of 7.6. Here too, the save-all functioned poorly with regard to rosin retention, which was only 40 per cent. This contrasted with the 93.5 per cent retention of rosin, when the pH of the water was 4.6 and when both titanium oxide and starch were absent from the furnish. The retention of rosin was not affected appreciably by the percentage of free acids in the initial size. The entire study appears to be of an orienting nature, since certain other variables have not been considered.

Georg Jayme and Werner Demmig. *Das Papier* **14**, 408-14 (1960) (in German).

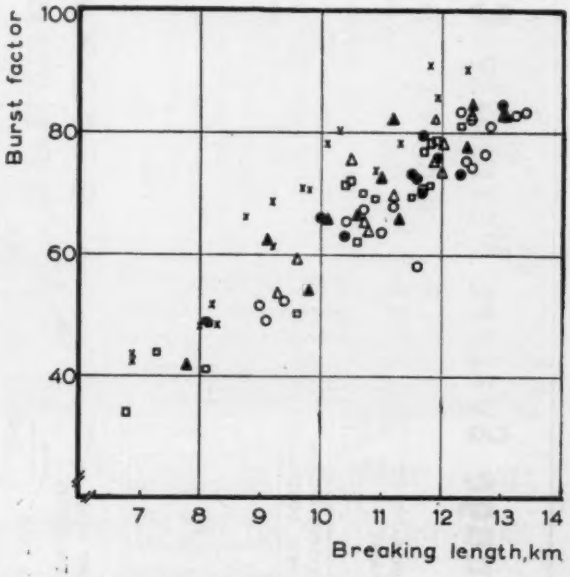
Neutral sulfite pulping of wheat straw

The straw which contained 66 per cent stalks, 18 per cent leaves, 13 per cent nodes, and 3 per cent ears, was pulped by the NSSC process at a high temperature of 165° C. for short periods (e.g. 0, 30, or 60 min. at maximum pressure), using varying amounts of sodium sulfite (i.e. 0.3, 0.5, or 0.7 times the original lignin content of the straw). A chemical analysis of the raw material furnished the following data: 24 per cent pentosans, 16 per cent lignin, 8 per cent ash (high in silica) and 3 per cent alcohol-benzene extractives. The pulps obtained were either fiberized mechanically in a Schopper disintegrator, or chemically by the use of 0.05 *N* oxalic acid or 0.01 *N* sulfuric acid with 2 hr. digestions at 100° C. When in the original cook, (the chemicals used amounted to 0.5 to 0.7 times the percentage lignin,) fiberization proved satisfactory. However, when smaller amounts of chemicals were used, adequate fiberization could only be obtained by extending the time of cooking. Shortened cooking periods favored the properties of the pulp (even when added chemicals had to be used). Shortened cooks were also favorable to a continuous pulping process. Pulps that had been fiberized mechanically often showed better strength and sheet-forming properties than those that had been fiberized by chemical treatments. However there were certain conditions in which the so-called "post-hydrolysis" improved the defibration without too much loss of strength. To obtain straw pulps of good fiberizability, it was shown that the cooking process should remove arabinose (perferably more than xylose) units of the hemicelluloses in the wheat straw. The authors report that they have evidence that there is a lignin-hemicellulose bond in the straw. Cleavage of this bond (not necessarily at the exact juncture of these components) seems to promote the fiberization of the pulps.

G. Vamos and P. Lengyel. *Papierwereld* (Holland) **14**, No. 5 447-52; 456-7 (Dec. 1959 and Jan. 1960); through *Abstr. Bull. Inst. Paper Chem.* **31**, 231 (1960) (original article in English).

Magnesium bisulfite cooking of spruce wood

Sprucewood (*Picea excelsa*) was pulped in small digesters with magnesium bisulfite, using liquors having the desired pH ranges. The pH (at 20°C.) used were 3, 4, and 5 at the inception of the digestions. In each case 200 g. of chips were used; these



Burst factor vs. breaking length.

○	Mg-bisulfite	cooked	at	max.	temp.	140° C.
△	»	»	»	»	»	150° C.
●	»	»	»	»	»	160° C.
▲	»	»	»	»	»	170° C.
□	Acid Mg-sulfite	»	»	»	»	135° C.
×	Normal sulphate	»	»	»	»	170° C.

Fig. 1

were steamed 15 minutes and then given five "pressure shocks" at 55°C. under nitrogen, according to Vilamo (cf. *Svensk Patentansokande* 26, Jan 1955). Liquor was then withdrawn so as to give a total sulfur dioxide content of 14 per cent based on oven-dried wood. Temperatures were then raised within 30 minutes, to 100°C. and subsequently to whatever maximum was to be reached, at the rate of 0.5° per minute. Digestions were made, using maximum temperatures of 140°, 150°, 160° and 170°C. For purposes of comparison, two series of cooks were also run using

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the same wood, but using an ordinary magnesium acid sulfite digestion at a maximum temperature of 135° and an ordinary kraft cook with a maximum temperature of 170°C. Here the respective yields were 50 and 48-49 per cent. In the case of magnesium bisulfite digestions, the yields varied, but the average were about 60 per cent. The results of 17 such cooks are tabulated, giving the digestion periods, max. temperatures, pH (initial and final, at 20°), per cent sulfur dioxide added and consumed, total yield, screenings, Kappa number, brightness (in only certain cases), degree S-R., breaking length in meters, tear factor and burst factor. The magnefite pulps were easily defibered. The brightness was fairly satisfactory, but not superior to that of the conventional acid sulfite pulp. The magnefite process consumed about 10.5 per cent sulfur dioxide, which is above that required in the sodium bisulfite digestion. The unbleached magnefite pulps were intermediate in strength between those prepared by the acid magnesium sulfite process and that prepared by the sulfate method. Breaking lengths of the magnefite pulps approached those of the kraft pulps, but their tear factors were considerably lower. However, magnefite pulps were more easily beaten to full strength than were the kraft pulps. Fig. 1 shows the burst factor plotted against the breaking length for pulps prepared at various maximum temperatures. There is a tendency for the burst factor to decrease with decreasing digestion temperatures. At a specific tensile strength, kraft pulps have a markedly higher bursting strength than have the magnefite pulps.

Ten references. H. W. Giertz and S. Wenneras, *Norsk Skogind.* 14, 322-329 (1960); in English.

Improvement in printability of paper by addition of straw pulp

The authors used the recently developed FOGRA test printing apparatus in their studies on the printability of paper. When straw pulp was beaten separately and then added to beaten spruce pulp, a significant improvement in printability of the finished sheet was noted. However further improvement would probably result if the straw pulp were (freed from nodes and) beaten very lightly and then added to the more fully beaten spruce pulp. In the present studies this was not the case. Indirectly, the present work confirms that of Brecht and Globig, although the studies of Brecht were not applied directly to printability. It is apparent that the view often held that the addition of straw pulps to other furnishes has an adverse effect on printability is incorrect, and has not been substantiated experimentally.

Six references. Ferdinand Wultsch and Karl Schubert. *Das Papier* 14, 458-61 (1960) (In German, with English summary).

Oxidized starch in wallpaper manufacture

The use of oxidized starch as an adhesive in the color-coating of wall papers had the following advantages over the usual coating adhesives: it improved the uniformity of coverage of the paper surface; it increased the adhesive strength of the coating; and it also reduced the amount of starch required. Apparently oxidized starch for wall paper coatings has been introduced on an experimental basis in a mill in Riga.

S. I. Andaburskii and I. N. Khain. *Bumazh. Prom.* 34, No. 6. 24-5 (June 1959) (Original in Russian) through *Abstr. Bull. Inst. Paper Chem.* 31, 334 (1960).

Studies on the quality of groundwood used for newsprint

In a mill using five continuous Kamyr grinders, the peripheral speed on one of these was reduced from 24.3 to 19 meters per second. During a one month period pulp samples were then taken from each of the five grinders. These pulp samples were tested and it was shown that the reduction of peripheral speed improved the quality of the mechanical pulp. One of the studies made was the effect of longer pulp fibers on the initial web wet strength. An increase in the long fiber content did not influence this wet strength in a sheet having a dry content of 25 per cent. On the other hand a high content of these long fibers results in a high freeness, and

this gives rise to a higher dry content due to constant dewatering conditions. Thus, indirectly, the long fiber content influences the wet strength of the web, since an increase in the dry content also serves to increase strength. There was also a good correlation between the initial wet web strength (at 25 per cent dry content) and the tensile strength of the finished sheet after drying.

An investigation was also made of the relationship between the long fiber content of groundwood and its physical strength properties, defining the "long fibers" as those in a residue held on a 100-mesh screen in a Hillbom classifier. The maximum folding endurance was obtained when the pulp retained 50 to 60 per cent of these long fibers. The role played by these long fibers is discussed.

Twenty two graphs are included. Odd Antonsen. *Norsk Skogind.* 14, No. 8, 294-302 (1960) (In Norwegian, with English summary).

Electron microscopic studies of groundwood fines

In this, their first paper on this subject, the authors undertook an investigation at the Institute of Technology at Graz, Austria. The earlier literature was reviewed critically. In their own studies,

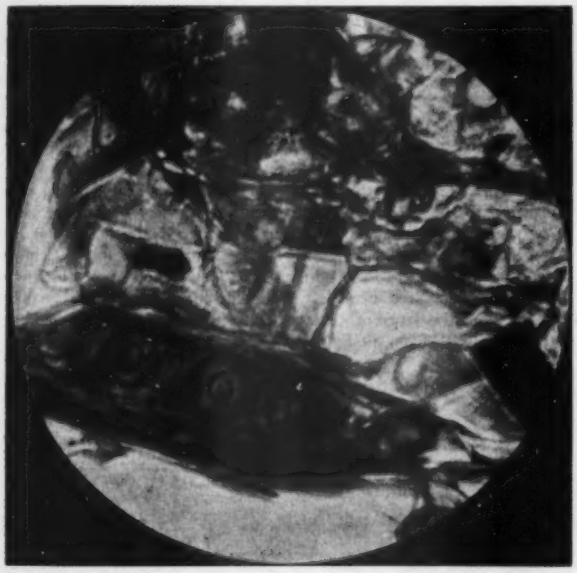

Fig. 2

with the electron microscope and a phase contrast microscope, they obtained data, which in part served to explain why the results of some of the earlier studies were inadequate.

Two samples of fines obtained from a commercial grinding operation of American conifers in a Newfoundland mill were used. Their treatment prior to the present study is described fully. The fines in water suspension were freeze dried giving a highly porous loose cake. More frequently the fines were suspended in acetone, and gradually freed from supernatant material. Finally the dry acetone was replaced by anhydrous benzene, from which the fines were also freeze dried. In this case a finely powdered material was obtained which was either colorless or pale yellow and which was very easily electrified.

The data obtained are in general harmony with the views of Brecht and his co-workers, who considered that there were different types of fines. At least three such types are here described: fibrils, a gelatinous fraction (termed "Mehlstoff" by Brecht) and an important lamellar fraction. The gel appears to contain much lignin. The gelatinous "Mehlstoff" should be differentiated in its behavior from microscopic wood meal (as suggested by Brecht). Twelve interesting photomicrographs, at various magnifications, are given. Fig. 2 shows a phase contrast photomicrograph of fines freeze-dried from benzene.

Fifty eight references. Marietta Ruck and Heinz Ruck. *Das Papier* 14, 399-408 (1960) (in German, with Engilsh summary).

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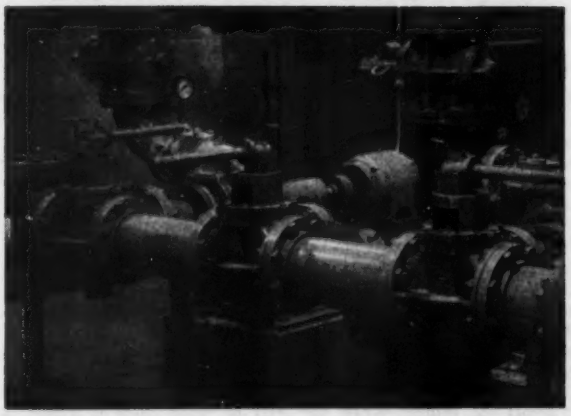

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PATENT REVIEWS

DR. MELVIN NORD

Wood chip level control

U. S. 2,938,639, issued May 31, 1960, to Millard C. Boyd and assigned to Allied Chemical Corp., provides an apparatus for regulating the transfer of wood chips from a storage container and supplying them to a feed container from which the wood chips are withdrawn and pass at a controlled rate to a vessel in which they are treated.

As shown in Fig. 1, a wood chip storage silo 1 is provided at its bottom with a rotary plate feeder 2 driven by a constant speed drive motor 3 through a variable ratio gear reducer 4. An elevator 5 carries the wood chips from the plate feeder to a chute 6 which discharges the wood chips into the top of wood chip feed bin 7 approximately at its center. From the bottom of the feed the wood chips pass into a hopper 8 from which they are drawn into a wood digester 9.

A probe electrode 10 extends centrally from the top to near the bottom of feed bin 7. The metal side wall 11 of the feed bin is electrically grounded as shown at 12 and forms the second electrode of a feed bin capacitor in which the wood chips are the dielectric between the two electrodes. Probe electrode 10 consists of a rod of conductive metal. It is covered with a non-conductive material whose electrical properties are not affected substantially by moisture.

A shielded coaxial lead 13 connects the probe electrode with a unit 14, which is a radio frequency capacitance sensing bridge of the Wein type. Voltage pick-up coils in each arm of the bridge are coupled to the primary of a radio frequency oscillator coil. One arm of this bridge contains a variable capacitor which is adjusted to equal the capacitance of the chip feed bin capacitor and its lead to unit 14 when the wood chips are at the lowest permissible level in the bin. With this adjustment no current flows across the bridge. When the level of wood chips is higher, a potential difference exists across the bridge and current will flow in a circuit connected to the output leads of the bridge. This current actuates motor 31, alternately raising and lowering the chip level within desired limits.

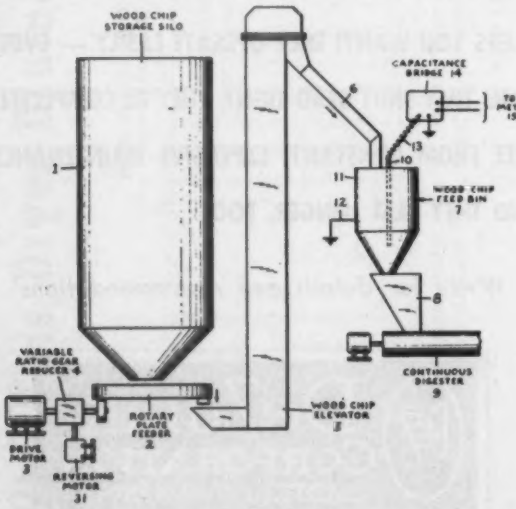

Fig. 1.

Treatment of cellulosic pulps

U. S. 2,940,890, issued June 14, 1960, to Ralph V. Braun and assigned to Kimberly-Clark Corp., describes a process for utilizing kraft pulp or west coast sulfite in the manufacture of a soft, pliable, dry creped cellulosic tissue product.

The pulp is dispersed in water and a small amount of fatty acid is introduced into the pulp dispersion (0.1 to 0.75 per cent by weight of the oven dry pulp). The fatty acid should contain not more than one unsaturated bond and 16 to 18 carbon atoms (e.g.) oleic acid). The pulp dispersion is maintained at a pH of less than 6.5 with a mineral acid. A continuous web is formed from the dispersion, dried on a Yankee dryer, and continuously creped.

Method of producing drum-finished coated paper

U. S. 2,950,989, issued Aug. 30, 1960 to Eben W. Freeman and assigned to S.D. Warren Co., describes a process for producing drum-finished coated paper.

The process consists of imparting translatory motion to a web of paper bearing a water-wettable surface layer of coating containing mineral pigment and adhesive material, directing steam against the layer of coating, maintaining the layer of coating out of contact with air and delivering it in a moist and heated condition into firm contact with a heated metallic finishing surface, eliminating water from the layer of coating, and removing and carrying away the coated web from the finishing surface.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Disposal filter bag	Studley Paper Co. Inc.	2,945,558	7/19/60
Winder drives	Westinghouse Electric Corp.	2,945,637	"
Sizing of paper with acrylamide polymers	Dow Chemical Co.	2,945,775	"
Paper machine drive mechanism	Beloit Iron Works	2,946,231	7/26/60
Apparatus for coating paper	Champion Paper & Fibre Co.	2,946,307	"
Cover for the suction box of paper making machines	Henrik V. A. Wartiainen	2,946,379	"
Display cartons	Waldorf Paper Products Co.	2,946,433	"
Container	R. L. Kuss & Co. Inc.	2,946,494	"
Container	Firma Werner Bahlsen	2,946,495	"
Carton	General Foods Corp.	2,946,496	"
Egg carton	Arthur E. Randles, Jr. et al	2,946,497	"
Multicellular folding box structures	Federal Paper Board Co. Inc.	2,946,498	"
Hinge-type carton	C. W. Zumbiel Co.	2,946,499	"
Handle for multicellular folding boxes	Federal Paper Board Co. Inc.	2,946,501	"
Oscillator for web-winding devices	Champion Paper & Fibre Co.	2,946,532	"
Single can carrier	Federal Paper Board Co. Inc.	2,946,620	"
Two-can carrier	Federal Paper Board Co. Inc.	2,946,621	"
Carton flap deflecting and separating means	Fibreboard Paper Products Corp.	2,947,229	8/2/60
Paper machine dandy roll construction	Beloit Iron Works	2,947,356	"
Carton insert	Pet Milk Co.	2,947,460	"
Compartmented carton	Pillsbury Co.	2,947,461	"
Bottle carrier	P. Ballantine & Sons	2,947,462	"
Closure lids for paper containers	Lily-Tulip Cup Corp.	2,947,463	"
Handle bags	St. Regis Paper Co.	2,947,464	"
Fissured-coated fiberboard	Minnesota & Ontario Paper Co.	2,947,647	"
Production of wood pulp	Bauer Bros. Co.	2,947,655	"
Processing of spent cooking liquors	Scott Paper Co.	2,947,656	"

FOR FURTHER INFORMATION ON

- New Products
- New Literature
- Advertised products and services

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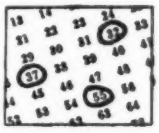

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New Products and New Literature

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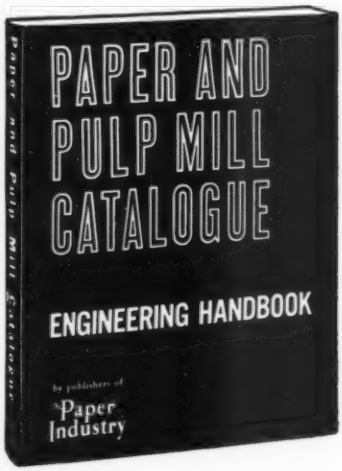

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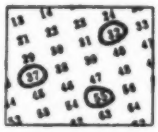

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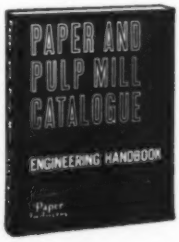
- **Engineering Handbook Section** — a compilation of practical engineering data, formulas, graphs, charts, tables, etc., including a section dealing with uses and hazards of chemicals used in pulp and paper making. New material added yearly.



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NEW PRODUCTS

These items are numbered for your convenience. Further information on the various products described may be requested at no obligation through our Readers' Service Dept. Use the business reply card in this issue.

New rustproofer

A non-flammable, odorless, non-toxic solvent that replaces kerosene for safely cleaning and rustproofing calender rolls, screens, and all types of paper mill equipment, does not soil or affect paper. It is wiped or sprayed on in water dilutions of 4 to 6 per cent, cleaning, degreasing and rustproofing in one operation, removing dirt, soils, sizes, pigments, oils, lint, etc. while leaving a minute, rustproofing film that will not hold dust, lint or dirt. It can also be used for spot cleaning of felts. *Harry Miller Corp.*

Circle No. 1 on Readers' Service Card

Hydraulic transmission

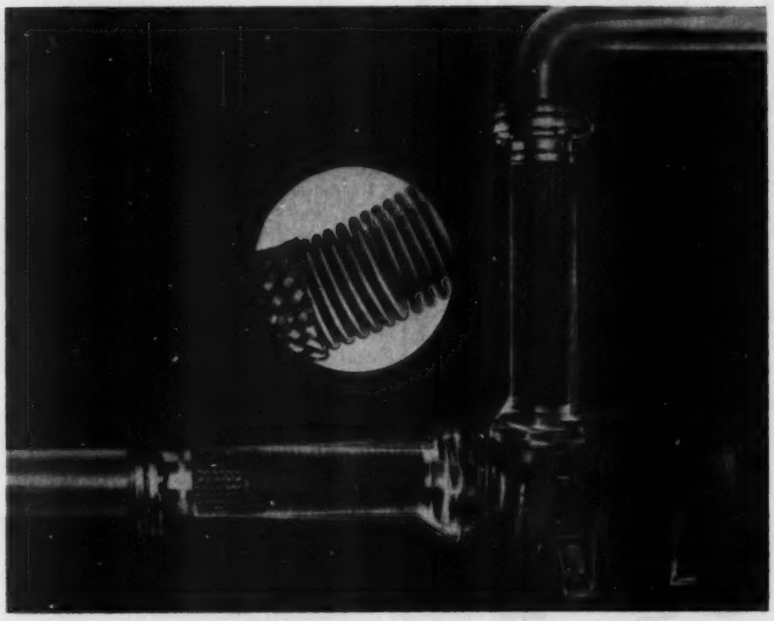
A new 10-HP variable speed hydraulic transmission permits low cost automation and modernization of existing machinery. The drive is 1800 RPM or less with any 2 to 10 HP motor or 20 HP gas engine. Precise speed selection is obtained by rotation of hand wheel giving infinite number of speeds through the entire range of the unit. The controls are easily altered for remote control. *Roberts Electric Co.*

Circle No. 2 on Readers' Service Card

Control valve

An abrasion-resistant, maintenance-free flow control valve, operating on a constriction or throttling principle, is now available in sizes and materials for any liquid, gas, solid or slurry at up to 125 psig at 230° F. Controlled by air or hydraulic pressure, manually or automatically regulated, it is of resilient construction, and requires no large external mechanical members. The valve is positive acting, explosion proof, self-cleaning, and responds instantly to temperature or pressure signal impulse. Maintenance-free operation for three years is claimed by the manufacturer. *D. M. Conner & Co.*

Circle No. 3 on Readers' Service Card



Flexible pump and pipeline connectors

The new H.A.P. Flexible Pump Connectors consist of a short section of corrugated flexible metal tubing, protected against pressure elongation by wire braid. They are furnished with threaded- or flanged-end connections to fit all standard piping sizes: ¼ to 16 in. in stainless steel; ¼ to 8 in. in bronze and hot-dip-galvanized steel; and ¼ to 4 in. in Monel.

The pump connectors handle pressures to 1500 psig., and their helical corrugations offer less resistance to flow, while distributing stresses along the entire hose length to minimize localized failures. The safety factor of each hose unit is four times the rated working pressure.

These connectors handle temperatures to 1200° F. in stainless steel, to 800° F. in Monel and to 450° F. in bronze. *Allied Metal Hose Co.*

Circle No. 4 on Readers' Service Card

Load control

The Loadtrol is a new means of maintaining a preset load on the drive motor of process equipment, machine tools or web handling machinery. It can be used to obtain maximum production from a crusher, saw, grinder, hammermill or pelletizer, and also may be used to preset web tension in a press, converter or winder. The Loadtrol has all solid state components, is designed for rough treatment and can be furnished in an explosion-proof enclosure. *Jordan Controls Inc.*

Circle No. 5 on Readers' Service Card

Air gap motor

A new radial air gap motor in the flange mounted construction features minimum overall length and reduced weight with low rotor inertia. It is designed for application where space limitations are critical and where fast acceleration, frequent start or reversing duty is required.

The new line includes ratings from ½ to 25 HP in speeds 900 through 3600 RPM in three basic frame sizes. Flexibility of the application of these motors is maximized by offering several HP ratings in each mounting flange diameter. In addition,

Hop On The Jenkins' METLKOR Bandwagon

You'll have plenty of company, for Paper Mill men everywhere are using Jenkins' METLKOR brushes for every paper brushing application. They are built better, to perform better, and last longer.

Jenkins' METLKOR Paper Polishing Brush.

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For more data circle 123 on Post Card

New Products . . .

a choice of four different flange diameters is available in 1, 1½ and 2 hp ratings and a 13 in. diameter flange may be supplied from 1 to 10 hp. *Fairbanks, Morse & Co.*
Circle No. 6 on Readers' Service Card

Plastic coating for tanks

Tanks can now be coated with plastisol and seamlessly lined with Paraline RD polyvinyl chloride plastic. Paraline RD is a process of applying a flexible, rubber-like material to metal in liquid form, then baking to produce a tough, seamless coating permanently bonded to the steel. The coating material is a specially compounded vinyl plastisol with a finished surface highly resistant to abrasion and impact. *Metal & Thermit Corp.*
Circle No. 7 on Readers' Service Card

Pilot operated control valve

The new 4-way solenoid controlled, pilot operated directional valve has a nominal capacity of 30 gpm, and is exceptionally quiet and cool in operation. The new unit is available with sub-plates having either ¾ in. pipe thread connections for flows up to 20 gpm, or 1 in. connections for flows above this figure. *Vickers Inc.*
Circle No. 8 on Readers' Service Card

Electronic detector

An electronic detector that automatically stops rotating equipment whenever excessive speed variation occurs, can be used on all types of conveyors, rotating kilns, mills, driers and other processing equipment. Electronically controlled with transistors, the detector can be mounted in any position, and can detect speed variations as small as 1 rpm. *Flo-Tronics Inc.*
Circle No. 9 on Readers' Service Card

Foam impact pads

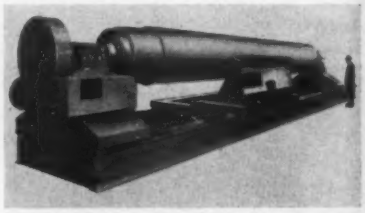
New polyurthane foam impact pads are now available for use in handling paper rolls and heavy machinery. These pads are vinyl-coated nylon covered, weigh 35 lbs, are light enough to be easily handled by one man, and are practically unaffected by acids, oils and weather. *Bilt-Rite Mfg. Co.*
Circle No. 10 on Readers' Service Card

Penetrating lubricant-preservative

A new anti-rust, anti-corrosive lubricant, Moovit, is said to be non-flammable, non-toxic and harmless to the skin. Invaluable for industrial plants, the lubricant safely removes rusted and corroded parts by finding its way between contacts. It withstands heat, prevents recurrence of rust on chrome and can be used as a cutting tool lubricant. *Lloyds Laboratories of America*
Circle No. 11 on Readers' Service Card

Laminating adhesives

A new copolymer emulsion of vinyl acetate and a chain acrylate called Gelva Emulsion TS-100, is custom-designed to fill the long-standing need of the adhesives industry for a good adhesive to bond the surfaces of chipboard, plywood, aluminum foil and glass. *Shawinigan Resins Corp.*
Circle No. 12 on Readers' Service Card



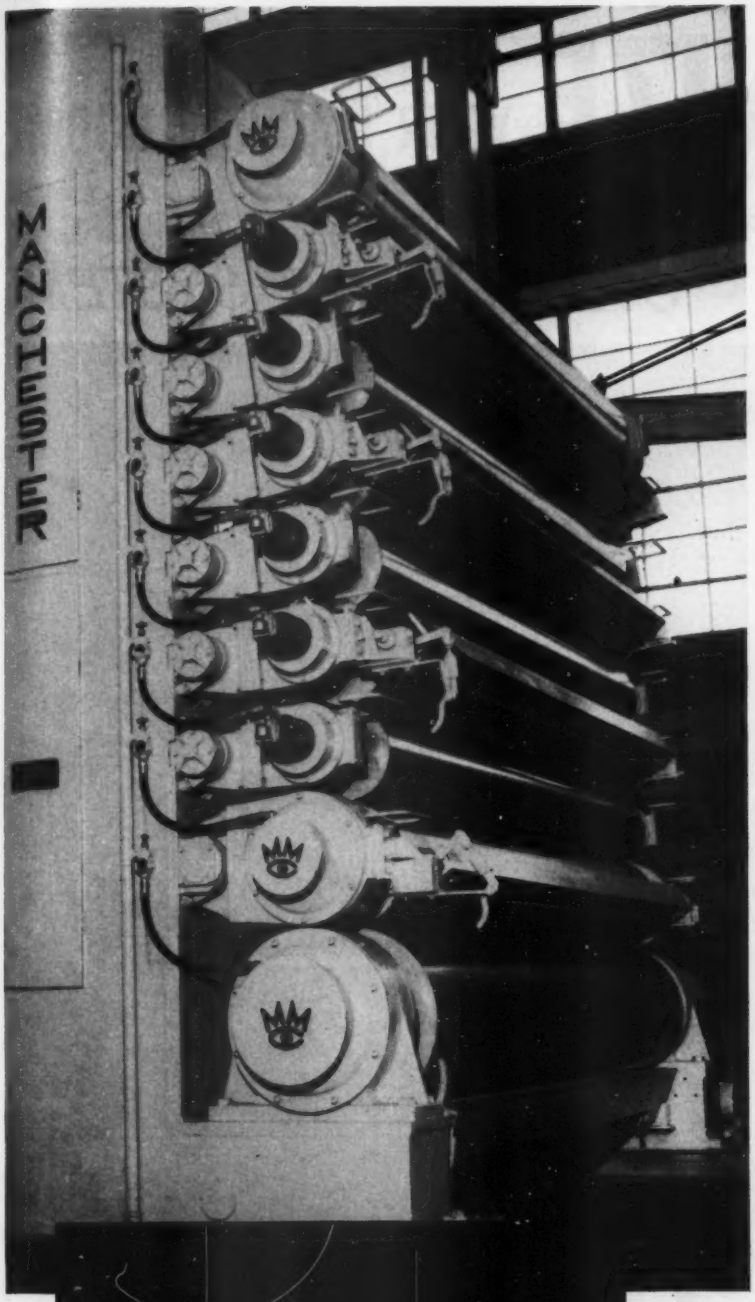
Drilling machine for paper suction rolls

The new Pathex machine designed and built for drilling to 150,000 3/16 in. diameter vacuum suction holes in the rubber covered surface of 35 by 5 ft. diameter paper mill rolls, is believed to be the first machine of its kind in the world and is performing the job with impressive cost savings. The machine handles rollers from 18- to 60-in.-diameter, up to 35 ft. long and weighing up to 6 tons. *Pathex Inc.*
Circle No. 13 on Readers' Service Card

Fuel additives

Three new fuel additives have been developed; two are designed to eliminate major problems in the use of residual fuel oils in modern industrial and utility boilers, and one is designed to improve fuel combustion in coal-fired boilers. Dearsol 30 is a combination sludge dispersant and combustion catalyst that prevents clogging. Dearsol 35, a liquid organic catalyst, in-

(Continued on page 751)



You can Rely on Lodding Doctors

Many progressive manufacturers of paper mill machinery, like The Manchester Machine Company, rely on Lodding's specialization in doctoring to complement their own manufacturing skills. So, besides serving the mills direct, Lodding acts as sub-contractor to the machine builders.

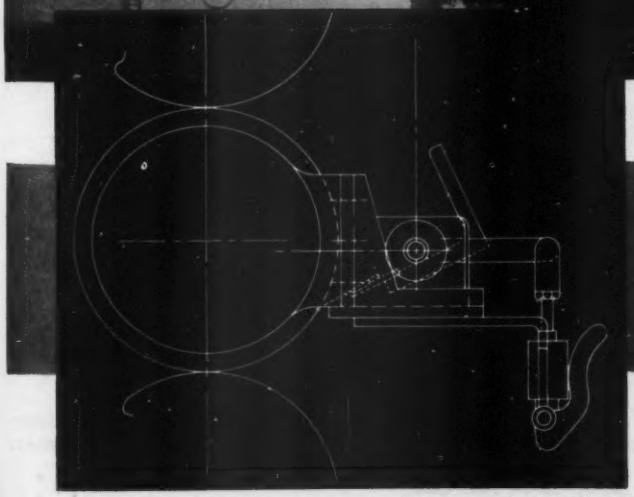
When this happens the engineering staffs of both companies work together for your ultimate benefit.

In sub-contracting, as always, Lodding stands squarely behind every doctor, assuming full responsibility for its workmanship and performance. Each is expressly designed for the exact roll on which it is to be mounted.

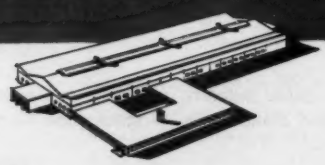
On calender stacks, for example, every doctor is built to fit exactly in position. Allowance is made to compensate for the crown in the roll. Doctors are mounted on the roll bearings. In this way each one always rides with the roll, perfectly aligned, exerting uniform pressure throughout. Doctor backs are provided with the necessary rigidity to prevent sag and vibration.

Whether your Lodding Doctors come through a machine builder or direct, you can rely on the kind of performance available only from the world leader in precision doctoring.

Get in touch with your nearest Lodding sales representative for full information.



LODDING
Engineering Corporation
AUBURN · MASSACHUSETTS



For more data circle 124 on Post Card

MODERNIZE YOUR MACHINE ROOM

for more efficiency with an

OVERLY'S AIR SYSTEM

An Overly's insulated aluminum panel machine hood with "air curtain" on the Nicolet Paper Corporation new No. 3 machine at West De Pere, Wisconsin.

OVERLY'S INCORPORATED

Box 468 Neenah Wisconsin

An air system by Overly's will give your machine room the operating efficiency and economy you need to meet today's papermaking demands. Whether your system requires a machine hood that incorporates an "air curtain" or one fabricated to your particular needs, it will pay you to investigate the advantages in an Overly's air system. Our engineers will gladly make recommendations, or submit quotations on your specifications, without obligation. Why not write or phone today?

WANT MORE ECONOMY? Write for details on the new Overly's "Liquidaire" economizer that utilizes the high efficiency of finned-tube heat transfer surfaces and produces results impossible with air-to-air economizers.

Serving the paper industry in custom metal fabrication of engineered air systems — Gardner Dryers — Westinghouse Sturdevant fans and steam coils — stock pipe — distributor rolls — suction boxes — white-water pans — head boxes — tanks.

For more data circle 125 on Post Card

New Products . . .

(Continued from page 748)

sures complete combustion of fuel. Fireside Treatment No. 1 is a combustion catalyst for coal-fired boilers that improves fuel combustion, minimizes slag build-up and insures maximum steam production efficiency. *Dearborn Chemical Co.*

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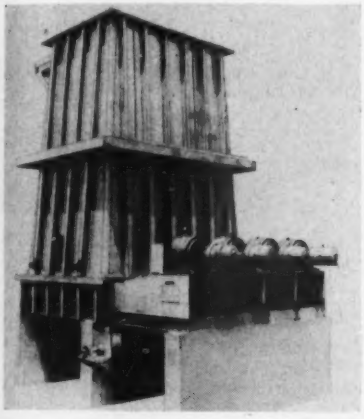

Live bottom bins

A new line of live bottom bins for continuous operation is now available, especially suited for providing continuous soaking and feeding of wood chips in the manufacture of cold caustic pulps or similar applications that require positive feeding to production units. The live bottom consists of heavy duty, continuous welded screw conveyors, gear driven in groups of three from variable or constant speed drives. *Sprout, Waldron & Co. Inc.*

Circle No. 15 on Readers' Service Card

Current-limiting circuit breakers

A new low-voltage current-limiting circuit breaker provides economical high-speed protection against fault currents up to 200,000 amps. The breaker provides time delay tripping for low- and medium-capacity faults, and instantaneous tripping for medium-capacity faults within the conventional low-voltage breaker range. The entire breaker fits into a single switchgear compartment. *I-T-E Circuit Breaker Co.*

Circle No. 16 on Readers' Service Card

Metering regulators

A complete line of metering regulators for oxygen, carbon dioxide, helium, nitrogen and argon, is now available. These regulators are accurate and can be mounted in any position without affecting the accuracy of flow. There are no gaskets to loosen, causing loss of gas, and the gauge dial is designed to show actual flow in cubic feet per hour consumed.

The regulators are virtually maintenance free and offer the user greater profit because accuracy and uniformity of flow permits a lower flow setting. *Harris Calorific Co.*

Circle No. 17 on Readers' Service Card

Motion safety switch

This motion safety switch is especially designed for protecting machines, equipment and processes against damage resulting from stoppages, and may be used to control a motor circuit or operate a warning device. The switch can be driven by any machine or equipment, and is 9¼ in. high and 9½ in. wide. *Fuller Co.*

Circle No. 18 on Readers' Service Card

New bleach

Sodium Perborate Tetahydrate, suitable for bleaching of paper, contains 10 per cent oxygen and is available in either powder or coarse granular form. It is odorless either wet or dry. *Samincorp*

Circle No. 19 on Readers' Service Card

Epoxy resin film adhesive

A new high strength supported epoxy resin film adhesive that combines the advantages of film adhesives with the self-filleting properties of epoxy adhesives, is now available. It provides uniform adhesive thickness throughout the assembly, controlled confinement of adhesive to the immediate bonding area, clean bonding operations and simple application procedures. Because the adhesive does not contain solvents, waste and shrinkage are avoided and solvent hazards and drying problems are eliminated. *Minnesota Mining & Mfg. Co.*

Circle No. 20 on Readers' Service Card

Steel drag chain

A new all-steel drag chain has been designed for high impact and tensile loads, durability and easy maintenance. The chain is especially designed for drag conveyors in saw mills, paper mills and similar applications. It operates on the same sprockets as H malleable iron and H combination drag chains, and is available in four sizes, 6 to 8 in. pitch, in widths from 7 to 16 in. Chain links are symmetrically designed with identical sliding area top and bottom which permits turning the chain over for added service life. *Link-Belt Co.*

Circle No. 21 on Readers' Service Card

COMPLETE SERVICE

- Design
- Construction
- Maintenance

LININGS AND TILE TANKS

STEBBINS
ENGINEERING AND MANUFACTURING CO.
Watertown, N. Y.

PENSACOLA, SEATTLE,
MONTREAL, VANCOUVER

For more data circle 126 on Post Card

Moisture balances

Four new moisture determination balances now make it possible to determine the moisture content of materials where a larger sample size is desirable or where greater accuracies as high as plus or minus .01 per cent are required. Both percentage moisture and weight of sample remaining can be read directly and continuously throughout the drying cycle. *Ohaus Scale Corp.*

Circle No. 22 on Readers' Service Card

New corrugating starch

A new starch, especially developed for corrugating adhesives, has been produced by flash drying. Practical benefits to the corrugator are faster dispersion, a more uniform adhesive paste, and better glue lines. *Corn Products Sales Co.*

Circle No. 23 on Readers' Service Card

Calcium stearate dispersion

This calcium stearate dispersion is high in solids and has a low viscosity. Composed of 46 per cent solids, it is thin, fluid, white,

Save Man Hours

Equip Your Digester House with a

HUMPHREY

Employee's Manlift

ELEVATOR

Eliminate stair climbing — save time — reduce employee fatigue. The endless belt provides continuous up and down transportation to and from sampling and operating floors. Easy and safe to operate with ready-at-hand stop and go controls and the exclusive Humphrey Safety Features.

Can be installed in any Multi-Floor Building

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HUMPHREY ELEVATOR COMPANY

Inc.

347 1st Ave. N.W.

Faribault, Minnesota

Humphrey is the original Manlift Elevator, made continuously since 1887.

For more data circle 127 on Post Card

New Products . . .

and aqueous, and has excellent dispersibility, assuring quick and easy incorporation into aqueous systems with minimal mixing. In the paper industry, it is ideally suited for all high-speed coating operations employed in the manufacture of machine-coated paper. *Harshaw Chemical Co.*

Circle No. 24 on Readers' Service Card

Absorption tester

The Vanceometer Tester is designed to evaluate in numerical terms, the absorption rate of sheet surfaces and forecast printability. It provides a means of maintaining quality control of the printing characteristics required of paper and paperboard. Results are obtained in a matter of seconds. It also forecasts the rate of absorption of adhesives, starches, sizes, inks, etc. *Testing Machines Inc.*

Circle No. 25 on Readers' Service Card

Surface active agents

A new series of anionic surfactants are designed to meet specific market needs. Marketed under the name Gafac, the surfactants are excellent emulsifiers and detergents which may be prepared with varying degrees of solubility in aromatic, aliphatic and chlorinated solvents, water and strong aqueous solutions. They also exhibit antistatic, corrosion inhibiting and lubricating properties. Gafac surfactants are supplied as the 100 per cent active free acid or as sodium salts. *General Aniline & Film Corp.*

Circle No. 26 on Readers' Service Card

Vegetable-based adhesive

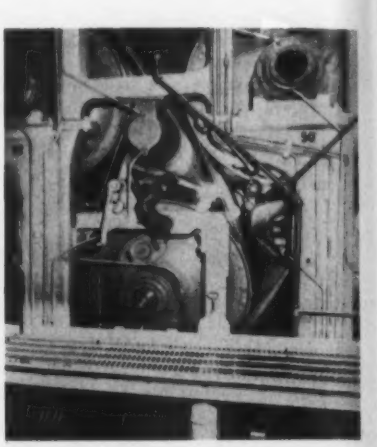
Development of a low viscosity vegetable-based adhesive, designed specifically for adhesive spray applications in paper mill roll-heading or mill-end-wrapping operations, has been announced. Called Cascola CS-257, the adhesive is said to atomize at low spray pressures, is non-clogging, and very fast setting. It can be used on nearly all conventional spray equipment. *Borden Chemical Co.*

Circle No. 27 on Readers' Service Card

Film-forming latex

A new film-forming styrene copolymer latex, to coat paper and paperboard for drinking cups, disposable containers and food packages, is now available. Designated Lytron 6A, the new material is said to provide a continuous, non-blocking, clear coating with excellent resistance to hot and cold liquids, grease and oils. Odorless, tasteless and non-yellowing, it is applied by spray coating, flush coating and web coating with conventional equipment, and is available in 55 gal. polyethylene-lined drums. *Monsanto Chemical Co.*

Circle No. 28 on Readers' Service Card



Air injector unit

A new Dryjector unit for improved ventilation of vapor pockets formed by the sheet, dryer and felt rolls, has been developed. The unit forces fresh, heated air into the centers of the pockets, dispelling moist vapors toward the edges of the sheet and into the exhaust system. Improved ventilation of the pockets results in a more uniformly dried sheet. *J. O. Ross Engineering*

Circle No. 29 on Readers' Service Card

Slurry valves

Especially designed for industries with slurry services, the new valves are manufactured for 150 lb. service, in sizes 3 to 30 in., in four fabricated style variations, and can be made in any material or stainless steel alloy. *Hilton Valves Inc.*

Circle No. 30 on Readers' Service Card

Horizontal reel

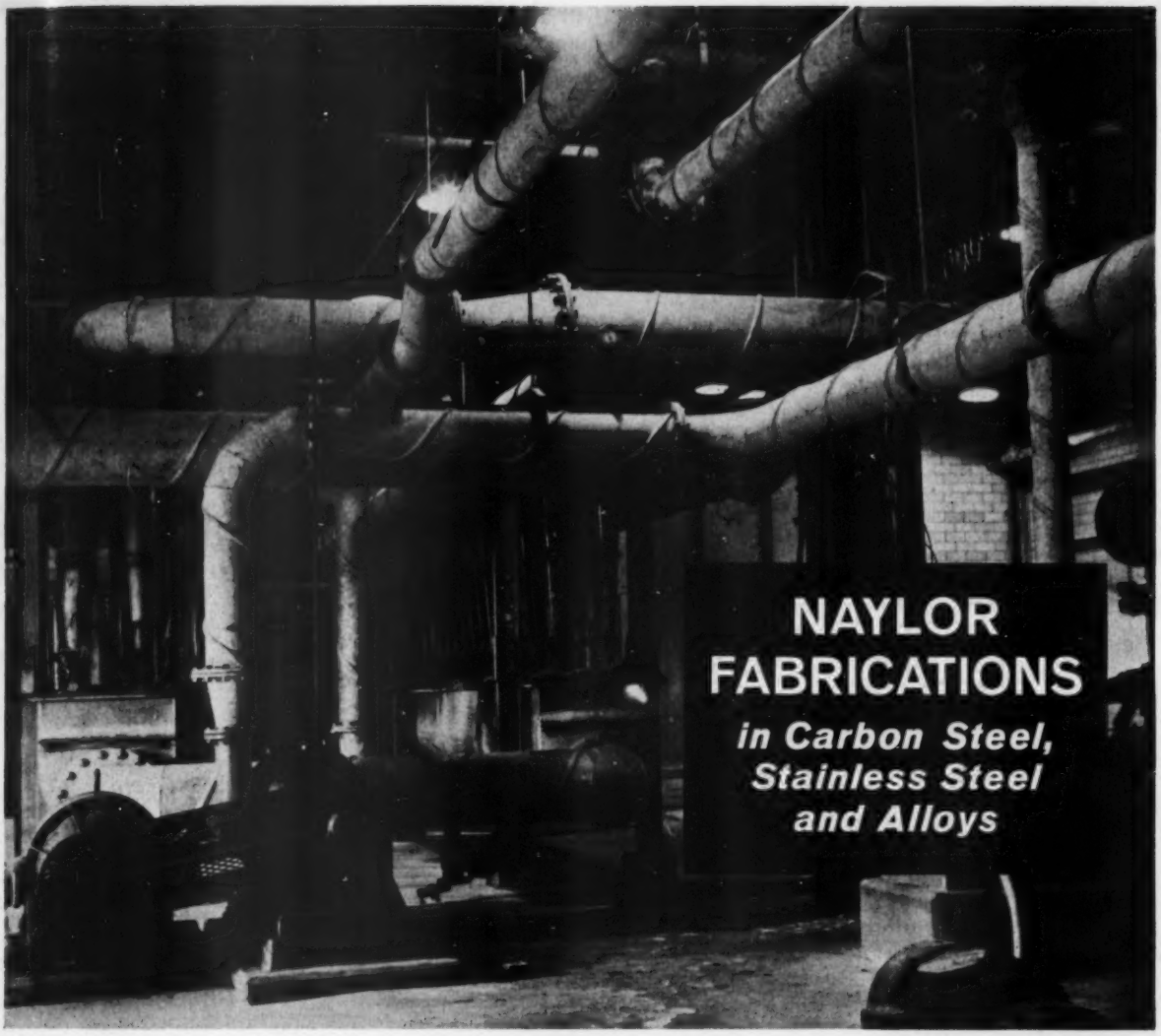
A new, compact, easy-to-operate horizontal reel, the Surfastart 1000, is sized for machines up to 100 in. trim and operating at speeds up to 1000 fpm, with operating roll diameters of 48, 60 and 72 in. The reel features primary arm loading, synchronized and retractable secondary slides, and anti-friction bearings. *Black Clawson Co., Dilts Division*

Circle No. 31 on Readers' Service Card

Electronic paper gauge

An electronic device said to be the first to measure paper accurately, continuously,

(Continued on page 754)



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Geared to your piping requirements, NAYLOR fabrication service can provide paper mill pipe, fittings and special fabrications to your exact specifications —from carbon steel, alloys or stainless steel.

NAYLOR pipe sizes range from 4″ to 30″ in diameter and wall thicknesses from 14 to 8 gauge. Special fabrications from 3″ to 44″ in diameter and wall thicknesses up to ⅜″. Standard fittings are available from stock.

Write for Bulletin No. 59 or send specifications for quotation.

NAYLOR PIPE *Company*

1233 East 92nd Street, Chicago 19, Illinois

Eastern U. S. and Foreign Sales Office: 60 East 42nd Street, New York 17, N. Y.

For more data circle 128 on Post Card

New Products . . .

(Continued from page 752)

and without "moisture errors" to insure quality control for the paper industry, has been developed. The Basis Weight Paper Gauge is used right on the production line and is expected to save paper mills by permitting corrective adjustments immediately. It will permit paper mills to become far more automatic, thus increasing production. *PolyTech Research Inc.*

Circle No. 32 on Readers' Service Card

Measuring device for bin operations

A new measuring device, Measurefill, for bin operations is applicable for pulp in the paper industry. It consists of a simple system of motors, belts, pulleys, cables and microswitches in the bin area where dust and vibration is most severe. Tension operates the system, and measurement is taken when the weight reaches the fill level. *PolyTech Research Inc.*

Circle No. 33 on Readers' Service Card

Thermoplastic polymer

Thermoplastic polymer Penton has a wide range of chemical resistance at elevated temperatures, and is being used for many applications in pipe, fittings, valves, pumps and metering devices. Penton is useful as a liner for storage tanks, process vessels, fume hoods, and ducts. Linings of Penton are satisfactory for a broad spectrum of corrosive conditions up to service temperatures of 200° to 220° F. *Hercules Powder Co.*

Circle No. 34 on Readers' Service Card

Tilting platform lift

A new platform lift has been introduced which lifts, tilts and dumps its load. Two oil-hydraulic power cylinders are utilized in elevation enabling it to lift two ton lots of wood pulp in paper manufacturing at a speed of about 20 fpm. The entire cycle of operation is pushbutton controlled from a single station at a lower level where the wood pulp is poured into the hopper. Oil pressure for operating the two cylinders is supplied by a 7½ hp motordriven oil pump. *Globe Hoist Co.*

Circle No. 35 on Readers' Service Card

SAFETY NEWS

Nine-month report on safety contest

FOR THE NINE MONTHS ended September 30, some 442 contestants reported perfect scores in the 1960 Paper Industry Safety Contest sponsored by the National Safety Council. The number of mills reporting in September was 625.

Last year's nine-month record was 397 perfect scores in a "field" of 701.

The January-September frequency rate for all divisions (except pulpwood logging) was 6.77, a 4-per-cent decrease from the same period in 1959. In the Pulp & Paper Division, the nine-month rate was 6.10, a 5-per-cent decrease from a year ago. In Paper Converting, a rate of 8.20 meant a 2-per-cent decrease from a year ago. Pulpwood Logging reported a rate of 29.72, down 11 per cent from last year.

Contestants working the most manhours in the January-September period without lost-time accidents were: Price Bros. & Co., Riverbend, P.Q., Canada; Consolidated Paper Corp., Pt. Alfred, P.Q., Canada; and Rayonier Inc., Jesup, Ga.

From the eligible mills in Division I, the board of judges will choose the mill with the most outstanding record. This plant will be awarded the grand prize—the Edward Benton Fritz Memorial Trophy—during the National Safety Congress in October. This trophy is presented each year by Fritz Publications Inc., publisher of THE PAPER INDUSTRY.

TO SUPPLEMENT AN industrial truck operators' safety program, the Automatic Transportation Co. is making available three new items: A Safety Award; Driver Training Diploma; and Drivers' License than can be personalized by the company for the individuals receiving the awards. These items along with others which the company offers, are designed to assist safety directors in setting up training programs and incentives to the operators when they complete their training programs. Copies of the new awards, plus other training manuals, are available free of charge from the Automatic Transportation Co., 149 West 87th St., Chicago, Ill.

Coming Events

TAPPI

January 20-21 — Course on Evolutionary Operation, Statler Hilton Hotel, Cleveland, Ohio.
February 20-23 — 46th Annual Meeting, Commodore Hotel, New York, N. Y.
March 16 — Graphic Arts, Inman's Restaurant, Galesburg, Mich.
April 6 — Visit Michigan Carton, Inman's, Galesburg, Mich.
May 25 — Recognition Night, Gull Harbor, Richland, Mich.

PIMA

February 9 — Training Machine Room & Stock Preparation Personnel, Hotel Harris, Kalamazoo, Mich.
March 16 — Joint Meeting with Craftsmen, Inman's Restaurant, Galesburg, Mich.
April 22 — Ladies' Night, Hotel Harris, Kalamazoo, Mich.
May 4 — Tri-Way Meeting (PIMA, CPPA, TAPPI)
May 11-13 — Pennsylvania-New Jersey-Delaware Division, Yorktowne Hotel, York, Pa.
May 25 — Recognition Night, Gull Harbor, Richland, Mich.

OTHER MEETINGS

January 23-26 — 12th Annual Plant Maintenance & Engineering Show, International Amphitheatre, Chicago, Ill.
January 24 — Miami Valley Meeting, Manchester Hotel, Middletown, Ohio.
January 24-27 — CPPA (Technical Association), Queen Elizabeth Hotel, Montreal.
January 26 — National Association of Secondary Materials Industries, (Midwestern Division), Statler-Hilton Hotel, Detroit, Mich.
January 30-February 9 — Quality Control Short Course, University of Illinois, Urbana, Ill.
February 6-7 — Third Annual Flexographic Technical Association Forum, Hotel Roosevelt, New York, N. Y.
February 6-10 — Norelco X-Ray School, Henry Hudson Hotel, New York, N. Y.
February 13-16 — 15th International Heating & Air-Conditioning Exposition, International Amphitheatre, Chicago, Ill.
February 20-24 — APA 1961 Annual Meeting, Waldorf Astoria, New York, N. Y.
February 20-24 — APPA 1961 Annual Meeting, Waldorf Astoria, New York, N. Y.
March 11-15 — 48th Annual Convention of the National Association of Secondary Materials Industries, San Francisco, Calif.
March 20-22 — FPBAA Annual Meeting, Drake Hotel, Chicago, Ill.
March 21-23 — American Power Conference, Sherman Hotel, Chicago, Ill.

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A realistic to-the-point series of 4 films teaches foremen how . . . by showing them how.

Again . . . from the National Safety Council . . . comes another supervisor training series: the all-new COMMUNICATION FOR SAFETY. Here are four films, produced by the same National Safety Council team that has won applause from safety-minded companies across the nation, with: "Safety and the Foreman"; "Supervising For Safety"; "Safety Management For Foremen"; "Speaking of Safety"; and "Human Factors in Safety". Remember — your company's safety program must be carried to your employees mainly by your supervisory personnel. It's up to them to learn the art of communication — not only for safety but to help make their work as supervisors more effective. THE COMMUNICATION FOR SAFETY film series is one way — an economical way—to TEACH THEM HOW BY SHOWING THEM HOW.

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For more data circle 129 on Post Card

NEW LITERATURE

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

Acetylene chemicals

Antara Chemicals, Division of General Aniline & Film Corp., has published a ready-reference data sheet on all of the company's commercially available high-pressure acetylene derivatives. Each product is described in full detail, with chemical structures, physical forms and description of properties and uses, being given.

Circle No. 36 on Readers' Service Card

Replacement screen plates

National Perforating Corp. has issued a bulletin on replacement screen plates to fit Cowan & Appleton screens. Specifications of different screen manufacturers are given in diameter of holes, distance between centers of the holes, approximate number of holes per sq. in. and percentage of open area.

Circle No. 37 on Readers' Service Card

Shaker type screen

Budow Machine & Mfg. Co. Inc. has issued a bulletin on their shaker type screens. Also included is information on the chip screen. Specifications as to size, hp, drive, production per hour and weight, are given.

Circle No. 38 on Readers' Service Card

Pulpwood harvester

B. L. Montague Co. has published a bulletin on their trailer-type pulpwood harvester. Complete specifications are given, along with profuse illustrations of its operation.

Circle No. 39 on Readers' Service Card

Sulfuric acid brochure

Allied Chemical Corp. has issued a new edition of the technical brochure on sulfuric acid. The profusely-illustrated 40-page data book includes the latest information on uses, manufacture, properties, storage, handling and methods of analysis. Charts have been revised for easier reference.

Circle No. 40 on Readers' Service Card

Safety training course

The National Safety Council has issued a booklet text on low-cost training for industrial foremen. Each text is for a one-hour training session for foremen. The leader's manual tells how to set up meetings and apply the material to individual plant situations.

Circle No. 41 on Readers' Service Card

Seamless welding fittings & flanges

Babcock & Wilcox Co., Tubular Products Div., has published a brochure on seamless welding fittings & flanges. The booklet includes charts of standard sizes and schedules, and contains a comprehensive breakdown of dimensional tolerances, illustrations of commonly produced fittings and flanges, and a chart of sizes and types available.

Circle No. 42 on Readers' Service Card

Spring and diaphragm actuators

Conoflow Corp. has issued a new bulletin on pneumatic spring and diaphragm actuators. The four-page bulletin illustrates and describes the series B-10 and B-20 actuators. It shows the various combinations including a butterfly valve, adjustable port valve, burner valve, etc. Complete specifications, operating characteristics and dimensions are listed.

Circle No. 43 on Readers' Service Card

Paint finishing

J. O. Ross Engineering has published a 12-page bulletin describing paint finishing systems and component units. It features a pictorial story of the finishing line, pictures, descriptions and technical data of the individual component parts, construction and conveyors.

Circle No. 44 on Readers' Service Card

Moisture control system for paper drying machines

Stickle Steam Specialties Co. is offering a bulletin on their new moisture control system for paper dryers, Pres-ten-trol. The bulletin illustrates and explains the method guaranteed to maintain exact moisture content.

Circle No. 45 on Readers' Service Card

Water treatment

Minneapolis-Honeywell Regulator Co. has published a new bulletin describing typical water treating systems used in the processing industries and showing how instrumentation has been applied to make these systems operate efficiently and economically.

Circle No. 46 on Readers' Service Card

Rotary vane feeder valves

Sprout-Waldron & Co. Inc. has announced the availability of a new bulletin giving complete information on a line of heavy duty, pressure tight, rotary vane feeder valves. The new line of feeder valves are designed to close tolerance fits to handle 25 psig internal pressure and high vacuum, and to seal against a differential pressure of 15 psig across the rotary element.

Circle No. 47 on Readers' Service Card

Liquid feeder

B-I-F Industries has a new bulletin providing the most recent information on the Omega Rotodip liquid feeder. It gives a detailed description of the feeder and its operation, including a list of typical materials handled; a schematic drawing of a dry-materials-to-liquid proportioning process; as well as principal dimensions of the Rotodip.

Circle No. 48 on Readers' Service Card

Latexes

The Dow Chemical Co. has published a new technical bulletin, Latexes of the Dow Chemical Co. It lists all sales latexes, their properties,

and typical areas of use. Styrene-butadiene, polystyrene, vinyltoluene-butadiene, saran, vinyl, and acrylic latex families are included. Paint, paper, textile, and buliding product use areas are emphasized.

Circle No. 49 on Readers' Service Card

Curl tester

Testing Machines Inc. is now making available a data sheet which illustrates and describes the TMI Curl Tester. This product is designed for use in determining the amount of curl which occurs in paper when the relative humidity is changed.

Circle No. 50 on Readers' Service Card

Elevated steel tanks

Chicago Bridge & Iron Co. has released a new brochure describing the design and function of elevated steel tanks for water storage. The 20-page publication places particular emphasis on spheroidal, radial cone and ellipsoidal tank designs in capacities ranging from 15,000 to 3,000,000 gal. Illustrated with photographs of structures, it also contains tables of standard capacities.

Circle No. 51 on Readers' Service Card

Heat exchangers

Old Dominion Iron & Steel Corp. is making available a catalog on heat exchangers. It shows construction details, engineering data and selection charts for all types of convertors and instantaneous heaters, both steam to water and water to water heat transfer. The catalog is supplemented with statistical tables.

Circle No. 52 on Readers' Service Card

Indicators

Minneapolis-Honeywell Regulator Co. is offering a bulletin describing their new indicators and indicating control stations, which record continuously the standard 4-20 ma dc output of any Electrik Tel-O-Set transmitter or transducer. They contain an integral transistorized power supply that makes possible two-wire transmission from field-mounted devices.

Circle No. 53 on Readers' Service Card

Flexible hose

Universal Metal Hose Co. has released a new 20-page catalog describing all-metal flexible hose to convey gases, solids and fluids. The hose is also used for vibration control and to compensate for motion or misalignment under high temperature, pressure, vacuum or abrasive conditions. Detailed descriptions, specifications, and applications-use photographs together with coupling recommendations are given.

Circle No. 54 on Readers' Service Card

Mechanical tubing

Babcock & Wilcox Co. is offering a bulletin on their electric-resistance-welded carbon steel mechanical tubing, Lectrosonic Cylinder tubing and Hydraulic line tubing. The bulletin includes additional information on the Lectrosonic process, details tube characteristics, and supplies ordering information.

Circle No. 55 on Readers' Service Card

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1961

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AND MERCHANTS'

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OF ALL NATIONS

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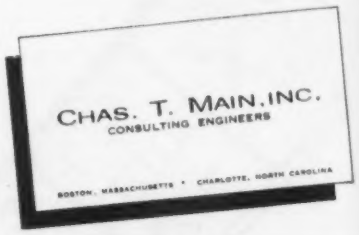

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Make your paper mill knowledge add to your income. No selling. Confidential. Write Box 710, The Paper Industry.

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FOR SALE

Two No. 245-DX-36" Bauer Single Disc Attrition Mills — Overdrive (complete with Sheaves & V-Belts), 125 HP Ideal drip-Proof induction motors, 1175 RPM, 440 volt, 3 phase, 60 cycle. K6323, Frame 584.

Condition: Excellent.

Price: $2500 each, as is, f.o.b. Port Huron, Michigan.

Subject to prior sale. For further information contact Purchasing Department, Peerless Cement Company, Free Press Building, Detroit 26, Michigan.

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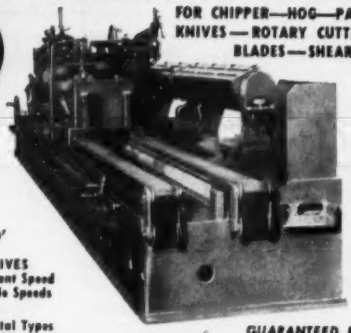
MODEL AK AUTOMATIC

FOR CHIPPER—HOG—PAPER—VENEER KNIVES — ROTARY CUTTERS — DOCTOR BLADES — SHEAR BLADES, ETC



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Capacity— 84" to 396"
Motors— 7½ to 40 HP
Speeds—10' to 100' and Faster
TRANSMISSION DRIVES
Mechanical—Constant Speed
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1. Guaranteed Construction
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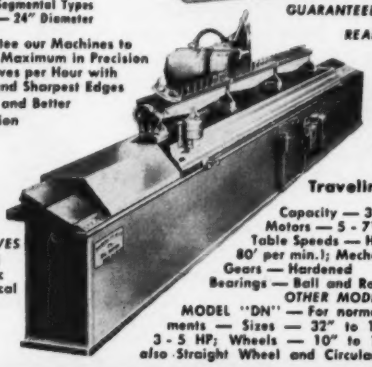
We Guarantee our Machines to Deliver the Maximum in Precision Ground Knives per Hour with the Finest and Sharpest Edges for Longer and Better Cutting Action



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Traveling Table Type

Capacity — 32" to 196"
Motors — 5 - 7½ - 10 - 15 HP
Table Speeds — Hydraulic (10' to 80' per min.); Mechanical (Constant)
Gears — Hardened
Bearings — Ball and Roller Types

TABLE DRIVES
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OTHER MODELS
MODEL "DN" — For normal knife requirements — Sizes — 32" to 108"; Motors — 3 - 5 HP; Wheels — 10" to 14" Diameter — also Straight Wheel and Circular Knife Grinders

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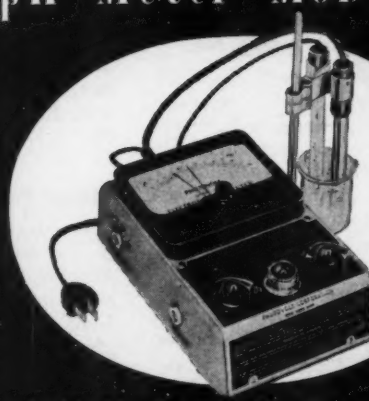
PHOTOVOLT
pH Meter MOD. 115



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Names in the News . . .

(Continued from page 742)

and has been instrumental in the design and modernization of several Bowaters mills. He has also been a director of Bowaters Southern; Bowaters Carolina Corp., Catawba, S. C.; Bowaters Engineering and Development; Bowater Corp. of North America Ltd.; Crossett Co., Crossett, Ark.; and Public Utilities Co., Crossett, Ark.

George Hobbs, former mill manager of Bowater's Newfoundland Pulp and Paper Mills Limited, Corner Brook, Newfoundland, will succeed Elderkin as President of E & D.

Lawson Co.

John E. Clark has been promoted to the newly created post of midwest sales manager of the Lawson Co., Division of Miehle-Goss-Dexter Inc., Chicago, Ill. Clark will be responsible for the marketing of paper cutters, book trimmers and drilling machines for this area.

A. Peyton

J. E. Clark

Carl W. Mullis Eng. & Mfg. Inc.

Arnold Peyton has been appointed chief sales engineer of this company at Lancaster, S.C. Peyton will be directly in charge of field sales and will be able to assist in planning and making layouts for complete sawmill installations. He formerly was sales engineer for Thomas Grate Bar Co., consulting engineer for St. Regis Paper Co., and Rust Engineering Co., and for the past four years, has been employed by Jackson Industries, Inc. of Birmingham.

Conoflow Corp.

George J. Baker has been appointed sales engineer for the New York district office of Conoflow Corp., Philadelphia, Pa. Baker has been with Conoflow for five years on the sales staff.

Thomas Testa has also been appointed sales engineer for the New York district office. Testa has a background of extensive experience in the process control field.

Albany Felt Co.

Edward W. Dewan has been appointed sales engineer for Albany Felt Co., Albany, N. Y. Dewan is servicing accounts in Western New York, Western Pennsylvania, Ohio and parts of Michigan. He has been with Albany Felt Co. in supervisory capacities for five years.

E. W. Dewan

E. W. Sacoff

Link-Belt Co.

Edward W. Sacoff of Link-Belt Co., Chicago, Ill., has been appointed manager of Link-Belt's district sales office at Moline, Illinois. Sacoff formerly served as a district sales engineer in the Chicago territory.

Hydromatics Inc.

John A. Wiedmann has been appointed chief engineer of the Industrial division of Hydromatics Inc., Bloomfield, N. J. An expert on control valve terminology, Wiedmann has been a member of a committee on valve design.

Jack W. Harris has been named industrial sales manager of the company. Harris formerly was associated with Rockwell Mfg. Co., Pittsburgh, Pa.

Riegel Paper Corp.

J. Hanes Lassiter has been elected to the board of directors of Riegel Paper Corp., Riegelsville, N.J. Lassiter, the chief executive of Lassiter Corp., Charlotte, N.C., was also elected a Riegel vice president.

Robert S. Bloomer has also been elected to the board of directors. He is the chief executive of Bloomer Bros. Co., Newark, N.J.

Western Michigan University

Dr. Alfred H. Nadelman, head of the paper technology department at Western Michigan University, Kalamazoo, Mich., has submitted his resignation at the close of the present semester in Jan. 1961. Nadelman came to Western Michigan in 1948 to direct the pulp and paper program. Recently he was elected to a three-year term on the executive committee of TAPPI. No successor has yet been named.

Whiting Corp.

H. B. Caldwell, of Whiting Corp., Harvey, Ill., and manager of the New York Domestic office, has been named corporation consultant for Swenson chemical processing equipment.

T. R. Elmblad and A. C. Kukral have been named managers of Whiting Corp's New York Domestic and Cleveland sales offices, respectively. Both were formerly in the Cleveland office.

R. J. Enroth moves from Chicago to the New York Domestic office and F. R. Schwantes, from Chicago to Cleveland.

Necrology . . .

Charles E. Radley

Charles E. Radley was vice president of Columbia Box Board Mills Inc. of Chatham and Walloomsac, N.Y. Radley was in the paper making business all his life, working with Oswego Falls Corp., Foster Paper Co. and then Columbia Boxboard. He was a member of TAPPI.

Bryon M. Oyster

Bryon M. Oyster was retired safety engineer for the Weyerhaeuser Co., Tacoma, Wash. Before joining Weyerhaeuser Oyster had served in various capacities as mill foreman, dredge engineer, and state logging inspector.

Thomas A. Hendry

Thomas A. Hendry, former general sales manager of the Abitibi Power & Paper Co., Toronto, Ont. and the Mead Sales Co., died at Boynton Beach, Fla. Hendry previously was with Dill & Collins of Philadelphia, McLaurin-Jones Paper Co., and Fraser Paper Co. Ltd.

Earl E. Edwards

Earl E. Edwards, purchasing agent for Wausau Paper Mills Co., Brokaw, Wis., died in Wausau. Edwards had been with Wausau Papers for over 33 years and was purchasing agent for over 20 years. He had also been assistant to the cost accountant and held various responsibilities as personnel and safety director.

MARKET QUOTATIONS

RAGS (Domestic)

New Cotton Cuttings

The following are brokers' and large dealers' average buying prices for sizeable lots in cents per pound f.o.b. New York:

	per cwt.
No. 1 white shirt cuttings	11.00— 12.00
Soft unbleached muslins	14.50— 15.00
Fancy shirt cuttings	2.00— 3.00
No. 1 percales	5.50— 6.00
No. 1 washables	2.25— 2.50
No. 1 light silesias	6.50— 7.00
No. 1 light prints	3.00— 4.00
Light flannelettes	5.50— 6.00
Cottonades	2.75— 3.25
Blue overall cuttings	5.50— 6.50
Blue cheviots	6.75— 7.25
Canton flannels, bleached	10.50— 11.00
Canton flannels, unbleached	10.50— 11.00
Osnaburg cuttings	9.50— 10.50
Underwear cuts, bleached	14.50— 15.00
Underwear cuts, unbleached	14.50— 15.00
Sun tan khaki cuttings	5.00— 5.50
America linen cuttings	6.75— 7.25

Cotton Rags

The following are prices, cents per pound, paid by dealers and brokers f.o.b New York:

	per cwt.
No. 1 roofing (Chicago)	.55— .60
No. 2 roofing (Chicago)	.40— .45
Twos and blues, repacked	2.00— 2.25
Thirds and blues, repacked	1.50— 1.75
No. 1 whites, repacked	—
No. 1 whites miscellaneous	—
No. 2 whites, repacked	—
No. 2 whites, miscellaneous	—

RAGS (Foreign)

(ex dock New York City)

New Rags

per cwt.

New dark cuttings	Nominal
New mixed cuttings	
New light silesias	
Light flannelettes	
Unbleached cuttings	
New white cuttings	
New light oxfords	
New light prints	

Old Rags

per cwt.

No. 1 white linens	Nominal
No. 2 white linens	
No. 3 white linens	
No. 4 white linens	
No. 1 white cottons	
No. 2 white cottons	
No. 3 white cottons	
No. 4 white cottons	
Extra light prints	
Ordinary light prints	
Medium light prints	
Dutch blue cottons	
French blue cottons	
French blue linens	
Checks and blues	
Linsey garments	
Dark cottons	
Old shopperies	

ROPE and BAGGING

F.o.b. and ex dock New York City

Gunny No. 1, domestic	—
Gunny No. 1, foreign	—
No. 1 manila rope, domestic	—
No. 1 manila rope, foreign	—
New burlap cuts (soft)	—
Sisal strings	—
Mixed strings	—

WASTE PAPER

The following are prices, dollars per net ton, paid by brokers and large dealers for carload quantities of baled stock, f.o.b. cars New York:

No. 1 hard white envelope cuttings	85.00— 90.00
No. 1 hard white shavings	70.00— 75.00
No. 1 soft white shavings	45.00— 50.00
Soft white shavings, uncoated	55.00— 60.00
Fly leaf shavings No. 1	17.00— 22.00
Fly leaf, woody, No. 1	17.00— 20.00
Mixed colored shavings	16.00— 18.00
No. 1 books and magazines	13.00— 15.00
Ledger stock, white, No. 1	40.00— 45.00
Ledger stock colored, No. 1 (Midwest ship)	30.00— 32.50
New manila envelope cuttings (free of groundwood)	50.00— 55.00
New manila envelope cuttings (containing groundwood)	40.00— 45.00
Manila tab cards	50.00— 55.00
Colored tab cards	40.00— 42.50
New northern kraft envelope cuttings	50.00— 55.00
Triple sorted kraft, 100%	30.00— 32.50
No. 1 old kraft	22.50—
White news cuts, No. 1	40.00— 45.00
No. 1 overissue news	15.00— 17.00
Folded news, special	11.00— 12.00
Folded news, ordinary	9.00— 10.00
Old corrugated boxes	15.00— 16.00
New jute corrugated cuts	19.00— 20.00
Mill wrappers	9.00— 11.00
Boxboard cuttings	4.00— 5.00
No. 1 mixed paper	1.00— 6.00

CHEMICALS

F.o.b. New York City

Alum, ammonium	
Granular, bags, works, cwt.	4.30—
Lump, drums, works, cwt.	5.05—
Powdered, drums, works, cwt.	5.20—
l-Arginine, drums, kilo	90.00—
Blanc Fixe	
Direct process, bags, c.l., works, ton	160.00—
L. c. l., ton	170.00—
Bleaching Powder, drums, cwt.	—
Casein, domestic acid precipitated	
30-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.56—
80-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.64—
China Clay, domestic dry-ground, airfloat, 99%	
325-mesh bags, c.l., Georgia works, ton	11.00— 17.00
300-mesh bags, c.l., Georgia works, ton	13.50— 22.50
Imported, white, lump, bulk, c. l., ex dock Phila, Portland, Me., gross ton	23.00— 35.00
Chlorine, liquid	
Tanks, single units, works, freight equaled, cwt.	3.25—
Glycerine, refined (CP, USP) 99%, drums c. l., delivered lb.	.30½—
Litharge, commercial powdered	
Barrels, c. l., works, freight equaled lb.	.13¼—
Rosin, gum, c. l., f.o.b. New York, cwt.	
K, M	16.40—
N	16.50—
WG	17.50—
WW	18.00—
Rosin, wood, c. l., f.o.b., shipping point, cwt.	
K, M	13.85—
N	13.45— 15.60
WG	13.55— 15.85
WW	18.00—
Saltcake, domestic, bulk works, 100% Na_2SO_4 basis ton	28.00—
Soda Ash	
Dense, 58%, paper bags, c.l. works, cwt	1.90—
Light, 58%, paper bags, c.l. works, cwt	1.85—
Soda, caustic	
Flake, 76%, drums, c. l. works, freight equalled, cwt	5.20—
Solid, 76%, drums, c. l. works, cwt.	4.80—
Sodium Silicate	
40°Be, 1:3.2, turbid, drums, c. l., works, cwt.	1.65—
52°Be, turbid, 1:2.4, drums, c. l., works, cwt.	2.65—
Starch	
Pearl, 140-lb. bags, cwt.	6.53—
Pearl 100-lb. bags, cwt.	6.38—
Powdered, 100-lb. paper bags, cwt.	6.58—
Sulfur, crude	
Bulk, c. l. mine, contract, long ton	23.50—
Talc	
Domestic, fibrous, N. Y., grd., bags, c. l. works, ton	28.00—
Canadian, ground, bags, c. l. works, ton	20.00— 35.00
Titanium Pigment	
Calcium-rutile base, regular, bags, c. l., lb.	.09½—
High-tinting, drums, c. l., lb.	.14½—
Zinc Oxide Pigment, American process	
Lead-free, bags, c. l. freight allowed, lb.	.14½—
Leaded, 35%, bags, c. l., freight allowed, lb.	.15½—

WOOD PULP

Quotations on domestic and Canadian pulp, dollars per short air-dry ton delivered consuming mills including basic allowances, follow:

Bleached sulfite, No. 1	140.00—
Bleached sulfite, Canadian	140.00—
Unbleached sulfite	135.00—
Unbleached sulfite, Canadian	135.00—
Bleached soda	135.00—140.00
Bleached soda, Canadian	135.00—140.00
Kraft, bleached hardwood	135.00—140.00
Kraft, bleached	145.00—150.00
Kraft, bleached southern	135.00—140.00
Kraft, bleached Canadian	150.00—
Kraft, unbleached southern	120.00—
Kraft, unbleached, Far West	125.00—
Kraft, unbleached Canadian eastern	135.00—
Kraft, unbleached Canadian western	120.00—125.00
Kraft, semi-bleached southern	130.00—
Sulfite screenings	—
Sulfate screenings	—

Quotations on imported wood pulp dollars per short air-dry ton on dock American Atlantic ports, follow:

Bleached sulfite Swedish, freight allowed	155.00—
Bleached sulfite, Norwegian, del'd with limited freight allowance	155.00—
Bleached sulfite, Finnish, freight allowed	155.00—
Unbleached sulfite, Swedish, freight allowed	135.00—
Unbleached sulfite, Finnish, freight allowed	135.00—
Kraft, unbleached, Swedish, freight allowed	125.00—
Kraft, unbleached, Finnish, freight allowed	125.00—
Kraft, bleached, Swedish, on dock	157.50—162.50
Kraft, bleached, Norwegian	155.00—

PAPER

Quotations are mill quotations Chicago

Boards (prices per ton, delivered in Chicago, 10 tons or more):	
Plain chip	107.50
News vat lined chip	110.00
.009 chip, rolls	100.00
Filled news	111.50
Solid news	114.50
White vat lined chip	144.50
Chip tube and can stock	112.50
Single manila lined chip	162.50
Single jute lined chip	147.50
Container, 42-lb.	
Kraft liner (per 1000 sq. ft.)	2.68
White patent coated	
.020	175.00
.018	177.50
.016	182.50

Book Paper (f.o.b. Chicago, c.l. skids per cwt):	
No. 1 enamels	20.80
No. 2 enamels	19.80
Machine-coated, 45- to 100-lb.	15.55— 19.00
60-lb. + uncoated offset, 25 × 38 (2000 lb.)	22.25
"A" grade English finish untrimmed, 25 × 38 (2000 lb.)	21.10
Rag Content Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):	per cwt
100% rag	—
75% "	—
50% "	—
25% "	—
Rag Content Ledger (white, 5000 to 10,000 lb., ream sealed cartons):	
100% rag	—
75% "	—
50% "	—
25% "	—
Sulfite Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):	
No. 1	—
No. 2	—
No. 4	—
Sulfite Ledger (white, 5000 to 10,000-lb., ream sealed cartons):	
No. 1	—
No. 2	—
No. 4	—
Newsprint (contract base price) per ton	
Rolls, standard	135.00
Sheets	Standard differentials
Kraft Wrapping — Natural (standard rolls 9- and 15-in. diam.)	per cwt
70-lb. and heavier	9.00
60-lb	9.25
50-lb.	9.50
40-lb.	9.75
35-lb.	10.25
30-lb.	11.00
25-lb.	11.75
20-lb.	12.75
No. 1 Kraft Butcher — Pink	
	per cwt
40-lb. only	10.50
(Sheets — Plus 50c cwt)	

Current Comments . . .

(Continued from page 734)

and various adhesives made in the U.S. by National. Manufacturing facilities and executive offices will be located in Sydney.

Net Incomes

KVP Sutherland Paper Co. — Net sales and income rose for the fiscal year ended September 30, net income rising to $5,477,516 from the previous year's $4,707,881, with sales going to $126,957,853, from the previous year's total of $120,995,274.

Allied Paper Corp. Net income for nine months ended September 30, $113,562; a year ago, $1,289,178.

National Vulcanized Fibre Co. — Net for nine months, $1,010,000; a year ago, $1,156,000.

West Virginia Pulp & Paper Co. — Income for year ended October 31, $11,000,000; a year ago, $11,777,000.

Lily-Tulip Corp. — Nine months income, $5,308,235; a year ago, $5,335,757.

Packaging Corp. — Combined earnings of the merged American Box Board, Ohio Boxboard and Central Fibre Products companies totaled $1,260,039 for the September quarter; a year ago, $1,780,908.

Standard Packaging Corp. — Income for 40 weeks ended October 9, $4,040,505; a year ago, $4,223,773.

Kimberly-Clark Corp. — Net income for six months ended October 31, $15,316,562; a year ago, $13,583,458. Sales increased to $203,416,848 from the 1959 figure of $192,604,020. These figures are startlingly different from the showing made by other major paper companies which as a rule reported decreased earnings for the nine months ended September 30 at the same time reporting increased sales.

Inland Container Corp. — First three quarters of 1960, $4,444,000; a year ago, $4,584,000.

Chesapeake Corp. of Virginia — Forty weeks ended Oct. 9, $2,910,246; a year ago, $2,897,617.

Minnesota & Ontario Paper Co. — Nine months, $4,717,095; a year ago, $4,423,420.

Oxford Paper Co. — Nine months, $2,133,282; a year ago, $1,609,472.

KVP Sutherland Paper Co. — Year ended Sept. 30, $5,477,516; a year ago, $4,707,881.

International Paper Co. — Nine months ended Sept. 30, $53,111,284; a year ago, $60,422,244.

Puget Sound Pulp & Timber Co. — Nine months of 1960, $3,455,656; a year ago, $3,356,771.

Financial notes

Paper mill securities were anything but favorites with investors following the election and the series of less impressive reports of earnings. The only exceptions to the prevailing lower quotations were those of the few companies whose earnings reports were better than the average for the industry.

Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	December 9, 1960	November 10, 1960
American Can	32½	33
Same Pref.	31⅛	36
Celotex	22	22⅞
Same Pref.	*17	*17⅛
Certain-Teed	13½	12⅜
Champion P & F Co.	24⅜	28⅛
Same Pref.	88⅛	90
Chesapeake of Va.	31½	33
Container	23⅞	23
Same Pref.	*91-92	*91½-94
Continental Can	32⅛	33⅞
Same Pref.	77¾	*78½
Crown Zellerbach	49⅛	47⅜
Same Pref.	90½	90½
Diamond National	25¾	32⅜
Same Pref.	29¾	*30-30⅛
Federal Paperboard	33	33
Same Pref.	22⅛	*21⅜-22⅜
Fibre Paper Board	26	28⅞
Great Northern	46⅛	40¼
Hammermill	27⅛	28
International	92⅞	100⅜
Same Pref.	94	*92¾-93¾
Kimberly-Clark	85¾	80¾
KVP Sutherland	28⅛	28⅜
MacAndrews & Forbes	26⅛	*26½-26⅝
Masonite	29¼	30¼
Mead Corp.	34⅛	36¼
Same Pref.	86½	*86-87½
Minn. & Ont.	29⅛	30½
Nat. Vulc. Fib.	21	20½
Oxford Paper	26⅛	26¼
Same Pref.	90	88½
Rayonier	17½	16¾
Riegel Paper	25	27¾
St. Regis	32¾	35½
Same Pref.	91	*91-94
Scott Paper	88¾	87⅛
Same $4 Pref.	85	87
Same $3.40 Pref.	73½	*74-75
Sealright	32⅜	33½
Standard Packaging	22⅛	23½
Same $1.60 Pref.	65	*63-75
Same $1.20 Pref.	27¼	29⅛
Same 6% Pref.	28	29⅛
Union Bag-Camp	33½	31¾
United Bd. & Cart.	22¼	*17⅝-18
U. S. Gypsum	104½	102½
Same Pref.	152½	*156½-159
West Va. P. & P.	37¼	36
Same Pref.	*94-97	*93½-97½

New York Stock Exchange — Bonds

Champion P&F Co. 4½%	101¾	104
Champion P&F Co. 3¾%	90	92⅛
Diamond Gardner 4%	91¼	..
Kimberly-Clark 3%	94	..
Oxford 4¾%	100	104⅛
Scott Paper 3%	113⅛	111¾

American Stock Exchange

Allied Paper	11	11⅛
American Writing	30¼	30
Brown Co.	13⅛	14⅜
Puget Sound	21¼	21½

*Closing bid and asked prices

News of the Industry . . .

(Continued from page 740)

Hercules Powder Co. Forms Fiber Development Dept.

Hercules Powder Co. has formed a Fiber Development Dept. and has appointed Forest B. Evans as manager of the new unit. This announcement followed the disclosure by Industrial Rayon Corp. that Hercules had purchased Industrial's fibers plant at Covington, Va. Hercules will convert the nylon section of the Covington plant to the spinning of polypropylene fibers, with an annual capacity in excess of ten million lbs. The converted facilities will be used to provide textile staple and continuous multifilament yarns.

Olin Mathieson Announces Start-up at New Container Plant

Operations have started at the new corrugated container plant of the Packaging Division of Olin Mathieson Chemical Corp. in St. Louis.

This new plant is a part of the Packaging Division's program for improving customer service in growth areas. It is a 38,000-sq.-ft. plant and has a production capacity of 25,000,000 sq. ft. of corrugated containers a year. It has a fully equipped container design laboratory where package designers will work with customers and prospects in developing new or modified packages to improve their programs.

Equipment in the new plant includes: one 50-in. by 103-in., two-color printer-slotter; two semi-automatic tappers; two semi-automatic stitchers; and an eccentric slotter; and a 96-in., six-bar slitter. A 38-in. by 78-in., one-color printer will be installed at a later date.

During the past year and a half, the Packaging Division has opened container plants in Dallas; Owosso, Mich.; Cincinnati; Joliet, Ill.; and Kansas City, Kan.

Mosinee Installs Lime Recovery System

Mosinee Paper Mills Co. of Mosinee, Wis., will be spending almost half a million dollars on a new lime recovery system. The new system will enable the company to reprocess lime sludge which presently is being discarded by the mill and used by farmers as a soil conditioner.

Through a continuous system that begins and ends at the pulp mill, the lime sludge is fed into a large rotating kiln or oven 8 ft. in diameter and 140 ft. long. The kiln was designed and built by Allis-Chalmers Mfg. Co. of Milwaukee, Wis.

Jefferson Chemical Dedicates Texas Plant

Jefferson Chemical Co. Inc. of Houston, Texas, has formally opened a new plant in Conroe, Texas.

The unit is already producing polypropylene glycol and propylene oxide triols, chemicals used in the manufacture of rigid and flexible polyurethane foams. Other products include morpholine, an intermediate used in surface active agents, rubber curing agents, corrosion inhibitors and many other applications and specialty surface active agents used in the manufacture of soaps and detergents.

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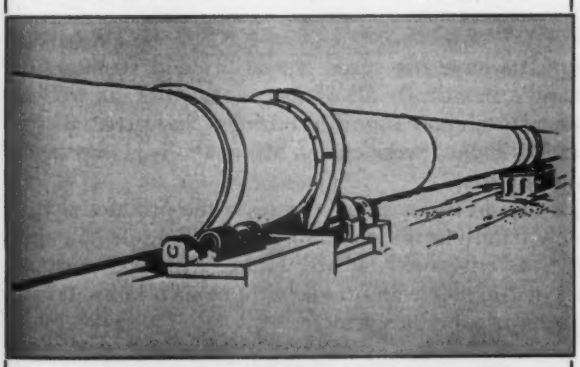

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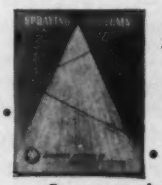

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Whither?

... in production, processes, new products, markets

Paper and board industry — 1961

Production of paper and board in 1961, according to the Business and Defense Services Administration of the U. S. Department of Commerce, is expected to be 35 million tons, while apparent consumption is likely to total 39.8 million tons. This would mean a production increase over 1960 of about 1.5 per cent and a consumption increase of 1 per cent. The long-range annual growth factors are of course 3.8 per cent for production and 3.5 per cent for consumption.

The role of starch in paper making

The paper industry ranks second only to the food industry in the consumption of starches. The major uses for starch, according to Dr. J. W. Swanson, of the Northern Utilization Research and Development Division, are: (1) beater additives for improving the strength of paper; (2) pigment-coating adhesives; (3) surface sizing of paper and board to control porosity, abrasion resistance, fuzz, gloss, and other surface properties; (4) laminating adhesive for the manufacture of fiberboard, tubes and cores; (5) corrugating adhesives for bonding corrugating material to outside liners; and (6) gluing adhesives for fastening seams and end flaps in sacks, etc.

"A very intensive research effort", said Dr. Swanson, "might increase the rate of the use of starch per ton of paper", so that by 1975 we may have a more than 100 per cent increase in the present use of starches in the paper industry.

What can the "new generation" of computers do?

The new-generation computers have the speed, versatility and economy of operation to efficiently handle practically all of the paper work, as well as procedural and mathematical problems found in business, industry and science, according to Walter W. Finke, president of Minneapolis-Honeywell's Electronic Data Processing Division.

The computers' major role in business is to increase the productivity of office workers by effectively handling the increasingly vast volume of paper work. Their ultimate role, as envisaged by Mr. Finke, will be the direct handling of all documents of commerce and trade without such intermediate steps as the punching of cards or paper tapes, etc.

Butane for conversion of seawater to fresh water

Using butane as a refrigerant and re-using it as a melting agent, seawater can be converted effectively to fresh water at the low energy consumption rate of 26 kw-hours per 1,000 gal. of fresh water, it was reported by George Karnofsky of the Blaw-Knox Co. A 10,000,000 gal/day capacity plant could be built for $20,000,000, as indicated by engineering studies.

In the process, seawater is partially frozen to a slush by direct contact with boiling butane at a pressure slightly below atmospheric. Since butane boils at a temperature (31° F) below that of the freezing point of water, its heat of vaporization is supplied by the heat of freezing of water.

The slush is washed free of salt and is melted by the reverse of the freezing process. Butane vapor from the freezer is compressed to slightly above atmospheric pressure, where its condensation temperature is above 32° F., and brought into intimate contact with the ice. This melts the ice and the condensed butane is then recycled to the freezer.

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